STMicroelectronics

ST31P450 A09
Security Target for composition

Common Criteria for IT security evaluation

SMD_ST31P450_ST_19_006 Rev A09.1

September 2026



www.st.com

BLANK

ST31P450 A09 platform Security Target for composition

Common Criteria for IT security evaluation

1 Introduction (ASE_INT)

1.1 Security Target reference

1 Document identification: ST31P450 A09 SECURITY TARGET FOR COMPOSITION.

2 Version number: Rev A09.1, issued in September 2026.

3 Registration: registered at ST Microelectronics under number SMD_ST31P450_ST_19_006.

1.2 TOE reference

4 This document presents **the Security Target (ST)** of the **ST31P450 A09** Security Integrated Circuit (IC), designed on the **ST31 platform of STMicroelectronics**, with firmware version 3.1.1 and 3.1.2.

5 The precise reference of the Target of Evaluation (TOE) is given in *Section 1.4: TOE identification* and the security IC features are given in *Section 1.6: TOE description*.

6 A glossary of terms and abbreviations used in this document is given in *Appendix A: Glossary*.

Contents

1 Introduction (ASE_INT) . . . 3

1.1 Security Target reference . . . 3

1.2 TOE reference . . . 3

1.3 Context . . . 10

1.4 TOE identification . . . 10

1.5 TOE overview . . . 11

1.6 TOE description . . . 12

1.6.1 TOE hardware description . . . 12

1.6.2 TOE software description . . . 13

1.6.3 TOE documentation . . . 14

1.6.4 Delivery format and method . . . 14

1.7 TOE life cycle . . . 14

1.8 TOE environment . . . 16

1.8.1 TOE Development Environment (Phase 2) . . . 16

1.8.2 TOE production environment . . . 17

1.8.3 TOE operational environment . . . 17

2 Conformance claims (ASE_CCL, ASE_ECD) . . . 18

2.1 Common Criteria conformance claims . . . 18

2.2 Package Claims . . . 18

2.2.1 Assurance package claims . . . 18

2.3 PP Claims . . . 18

2.3.1 PP Claims rationale . . . 19

2.3.2 Rationale regarding CC:2022 . . . 19

3 Security problem definition (ASE_SPD) . . . 23

3.1 Description of assets . . . 23

3.2 Threats . . . 24

3.3 Organisational security policies . . . 25

3.4 Assumptions . . . 27

4 Security objectives (ASE_OBJ) . . . 28

4.1 Security objectives for the TOE . . . 29

4.2 Security objectives for the environment 31
4.3 Security objectives rationale 33
4.3.1 TOE threat "Abuse of Functionality" 35
4.3.2 TOE threat "Memory Access Violation" 35
4.3.3 TOE threat "Diffusion of open samples" 35
4.3.4 Organisational security policy "Controlled usage to Loader Functionality" 35
4.3.5 Organisational security policy "Additional Specific Security Functionality" 36

5 Extended Components Definition (ASE_ECD) 37

6 Security requirements (ASE_REQ) 38
6.1 Security functional requirements for the TOE 38
6.1.1 Security Functional Requirements from the Protection Profile 41
6.1.2 Additional Security Functional Requirements for the cryptographic services 43
6.1.3 Additional Security Functional Requirements for the memories protection 44
6.1.4 Additional Security Functional Requirements related to the loading and authentication capabilities 45
6.1.5 Additional Security Functional Requirements related to the Secure Diagnostic capabilities 48
6.2 TOE security assurance requirements 49
6.3 Refinement of the security assurance requirements 51
6.3.1 Refinement regarding functional specification (ADV_FSP) 51
6.3.2 Refinement regarding test coverage (ATE_COV) 52
6.4 Security Requirements rationale 53
6.4.1 Rationale for the Security Functional Requirements 53
6.4.2 Additional security objectives are suitably addressed 57
6.4.3 Additional security requirements are consistent 60
6.4.4 Dependencies of Security Functional Requirements 61
6.4.5 Rationale for the Assurance Requirements 64

7 TOE summary specification (ASE_TSS) 66
7.1 Limited fault tolerance (FRU_FLT.2) 66
7.2 Failure with preservation of secure state (FPT_FLS.1) 66

7.3 Limited capabilities (FMT_LIM.1) / Test, Limited capabilities (FMT_LIM.1) / Sdiag, Limited capabilities (FMT_LIM.1) / Loader, Limited availability (FMT_LIM.2) / Test, Limited availability (FMT_LIM.2) / Sdiag & Limited availability (FMT_LIM.2) / Loader 66
7.4 Inter-TSF trusted channel (FTP_ITC.1) / Sdiag 67
7.5 Audit review (FAU_SAR.1) / Sdiag 67
7.6 Stored data confidentiality (FDP_SDC.1) 67
7.7 Stored data integrity monitoring and action (FDP_SDI.2) 67
7.8 Audit storage (FAU_SAS.1) 67
7.9 Resistance to physical attack (FPT_PHP.3) 67
7.10 Basic internal transfer protection (FDP_ITT.1), Basic internal TSF data transfer protection (FPT_ITT.1) & Subset information flow control (FDP_IFC.1) 68
7.11 Random number generation (FCS_RNG.1) 68
7.12 Cryptographic operation: TDES operation (FCS_COP.1) / TDES 68
7.13 Cryptographic operation: AES operation (FCS_COP.1) / AES 68
7.14 Static attribute initialisation (FMT_MSA.3) / Memories 68
7.15 Management of security attributes (FMT_MSA.1) / Memories & Specification of management functions (FMT_SMF.1) / Memories 69
7.16 Subset access control (FDP_ACC.1) / Memories & Security attribute based access control (FDP_ACF.1) / Memories 69
7.17 Authentication Proof of Identity (FIA_API.1) 69
7.18 Inter-TSF trusted channel (FTP_ITC.1) / Loader, Basic data exchange confidentiality (FDP_UCT.1) / Loader, Data exchange integrity (FDP_UIT.1) / Loader & Audit storage (FAU_SAS.1) / Loader 69
7.19 Subset access control (FDP_ACC.1) / Loader & Security attribute based access control (FDP_ACF.1) / Loader 69
7.20 Failure with preservation of secure state (FPT_FLS.1) / Loader 70
7.21 Static attribute initialisation (FMT_MSA.3) / Loader 70
7.22 Management of security attributes (FMT_MSA.1) / Loader & Specification of management functions (FMT_SMF.1) / Loader 70
7.23 Security roles (FMT_SMR.1) / Loader 70
7.24 Timing of identification (FIA_UID.1) / Loader & Timing of authentication (FIA_UAU.1) / Loader 70
7.25 Audit review (FAU_SAR.1) / Loader 70

8 Identification 71

9 References 76

Appendix A Glossary 78

A.1 Terms. 78

A.2 Abbreviations. 80

List of tables

Table 1. TOE components . . . 11
Table 2. Derivative devices configuration possibilities . . . 11
Table 3. Composite product life cycle phases . . . 16
Table 4. CC:2022 rationale . . . 20
Table 5. Summary of security aspects . . . 23
Table 6. Summary of security objectives . . . 28
Table 7. Security Objectives versus Assumptions, Threats or Policies . . . 34
Table 8. Summary of functional security requirements for the TOE . . . 38
Table 9. FCS_COP.1 iterations (cryptographic operations) . . . 44
Table 10. TOE security assurance requirements . . . 50
Table 11. Impact of EAL5 selection on BSI-CC-PP-0084-2014 refinements . . . 51
Table 12. Security Requirements versus Security Objectives . . . 53
Table 13. Dependencies of security functional requirements . . . 61
Table 14. TOE components . . . 71
Table 15. Guidance documentation . . . 71
Table 16. Sites list . . . 71
Table 17. Common Criteria . . . 76
Table 18. Protection Profile . . . 76
Table 19. Other standards . . . 76
Table 20. List of abbreviations . . . 80

List of figures

Figure 1. ST31P450 A09 platform block diagram 13
Figure 2. Security IC Life-Cycle 15

1.3 Context

7 The Target of Evaluation (TOE) referred to in *Section 1.4: TOE identification*, is evaluated under EUCC by the French National Cybersecurity Certification Authority (NCCA) and is developed by the Connected Security sub-group of STMicroelectronics (ST).

8 The assurance level of the performed Common Criteria (CC) IT Security Evaluation is EAL5 augmented by ASE_TSS.2, ALC_DVS.2, ALC_FLR.2 and AVA_VAN.5.

9 The intent of this Security Target is to specify the Security Functional Requirements (SFRs) and Security Assurance Requirements (SARs) applicable to the TOE security ICs, and to summarise their chosen TSF services and assurance measures.

10 This ST claims to be an instantiation of the "*Eurosmart - Security IC Platform Protection Profile with Augmentation Packages*" (PP) registered and certified under the reference *BSI-CC-PP-0084-2014* in the German IT Security Evaluation and Certification Scheme, ***with the following augmentations***:

- Addition #1: “Support of Cipher Schemes” from *AUG*
- Addition #4: “Area based Memory Access Control” from *AUG*
- Additions specific to this Security Target, some in compliance with *JIL-CC-SRFPDCL* and *ANSSI-CC-CER/F/06.002*.

The original text of this PP is typeset as indicated here, its augmentations from *AUG* as indicated here, and text originating in *JIL-CC-SRFPDCL* and *ANSSI-CC-CER/F/06.002* as indicated here, when they are reproduced in this document.

This ST instantiates the following packages from the above mentioned PP:

- Authentication of the Security IC
- Loader dedicated for usage in secured environment only
- Loader dedicated for usage by authorized users only.

11 Extensions introduced in this ST to the SFRs of the Protection Profile (PP) are exclusively drawn from the Common Criteria part 2 standard SFRs.

12 This ST makes various refinements to the above mentioned PP and *AUG*. They are all properly identified in the text typeset as ***indicated here*** or ~~here~~. The original text of the PP is repeated as scarcely as possible in this document for reading convenience. All PP identifiers have been however prefixed by their respective origin label: ***BSI*** for *BSI-CC-PP-0084-2014*, ***AUG1*** for Addition #1 of *AUG*, ***AUG4*** for Addition #4 of *AUG*., and ***JIL*** for *JIL-CC-SRFPDCL* and *ANSSI-CC-CER/F/06.002*.

1.4 TOE identification

13 The Target of Evaluation (TOE) is the ST31P450 A09 platform.

14 “ST31P450 A09” completely identifies the TOE including its components listed in *Table 1: TOE components*, its guidance documentation detailed in *Table 15: Guidance documentation*, and its development and production sites indicated in *Table 16: Sites list*.

15 A09 is the version of the evaluated platform. Any change in the TOE components, the guidance documentation and the list of sites leads to a new version of the evaluated platform, thus a new TOE.

Table 1. TOE components

IC Maskset name	IC version	Master identification number (1)	Firmware version
K410A	C	0x01F1	3.1.1 and 3.1.2

1. Part of the product information.

16 The IC maskset name is the product hardware identification.
The IC version is updated for any change in hardware (i.e. part of the layers of the maskset) or in the OST software.

17 All along the product life, the marking on the die, a set of accessible registers and a set of specific instructions allow the customer to check the product information, providing the identification elements, as listed in *Table 1: TOE components*, and the configuration elements as detailed in the Data Sheet, referenced in *Table 15: Guidance documentation*.

1.5 TOE overview

18 Designed for secure ID and banking applications, the TOE is a serial access microcontroller that incorporates the most recent generation of ARM® processors for embedded secure systems. Its SecurCore® SC000™ 32-bit RISC core is built on the Cortex™ M0 core with additional security features to help to protect against advanced forms of attacks.

19 Different derivative devices may be configured depending on the customer needs:

- either by ST during the manufacturing or packaging process,
- or by the customer during the packaging, or composite product integration, or personnalisation process.

20 They all share the same hardware design and the same maskset (denoted by the Master identification number). The Master identification number is unique for all product configurations.

21 The configuration of the derivative devices can impact the I/O mode, and the available NVM size, as detailed here below:

Table 2. Derivative devices configuration possibilities

Features	Possible values
I/O mode	Contact only, Dual mode, Contactless only
NVM size	320 or 450 Kbytes

22 All combinations of different features values are possible and covered by this certification. All possible configurations can vary under a unique IC, and without impact on security.

23 The Master identification number is unique for all product configurations.
Each derivative device has a specific Child product identification number, also part of the product information, and specified in the Data Sheet and in the Firmware User Manual, referenced in *Table 15*.

24 The rest of this document applies to all possible configurations of the TOE, except when a restriction is mentioned. For easier reading, the restrictions are typeset as indicated here.

25 In a few words, the ST31P450 A09 offers a unique combination of high performances and very powerful features for high level security:

- Die integrity,
- Monitoring of environmental parameters,
- Protection mechanisms against faults,
- AIS20/AIS31 class PTG.2 compliant True Random Number Generator,
- Hardware 3-key Triple DES accelerator,
- Hardware AES accelerator,
- ISO/IEC 13239 CRC calculation block,
- NExt Step CRYPTography accelerator (NESCRYPT).

26 More detail is provided in the following section: *Section 1.6: TOE description*.

1.6 TOE description

1.6.1 TOE hardware description

27 The TOE features hardware accelerators for advanced cryptographic functions, with built-in countermeasures against side channel attacks.

28 The AES (Advanced Encryption Standard *[3]*) accelerator provides a high-performance implementation of AES-128, AES-192 and AES-256 algorithms. It can operate in Electronic CodeBook (ECB) or Cipher Block Chaining (CBC) modes.

29 The 3-key triple DES accelerator (EDES+) supports efficiently the Triple Data Encryption Standard (TDES *[2]*), enabling Electronic Code Book (ECB) and Cipher Block Chaining (CBC) modes and DES computation.
Note that a triple DES can be performed by a triple DES computation or by 3 single DES computations.

30 The NESCRYPT crypto-processor allows fast and secure implementation of the most popular public key cryptosystems with a high level of performance (*[4]*, *[6]*, *[8]*,*[9]*, *[10]*, *[11]*).

31 The TOE offers 10 Kbytes of User RAM and up to 450 Kbytes of secure User high-density Flash memory (NVM).

32 As randomness is a key stone in many applications, the ST31P450 A09 features a highly reliable True Random Number Generator (TRNG), compliant with PTG.2 Class of AIS20/AIS31 *[1]* and directly accessible thru dedicated registers.

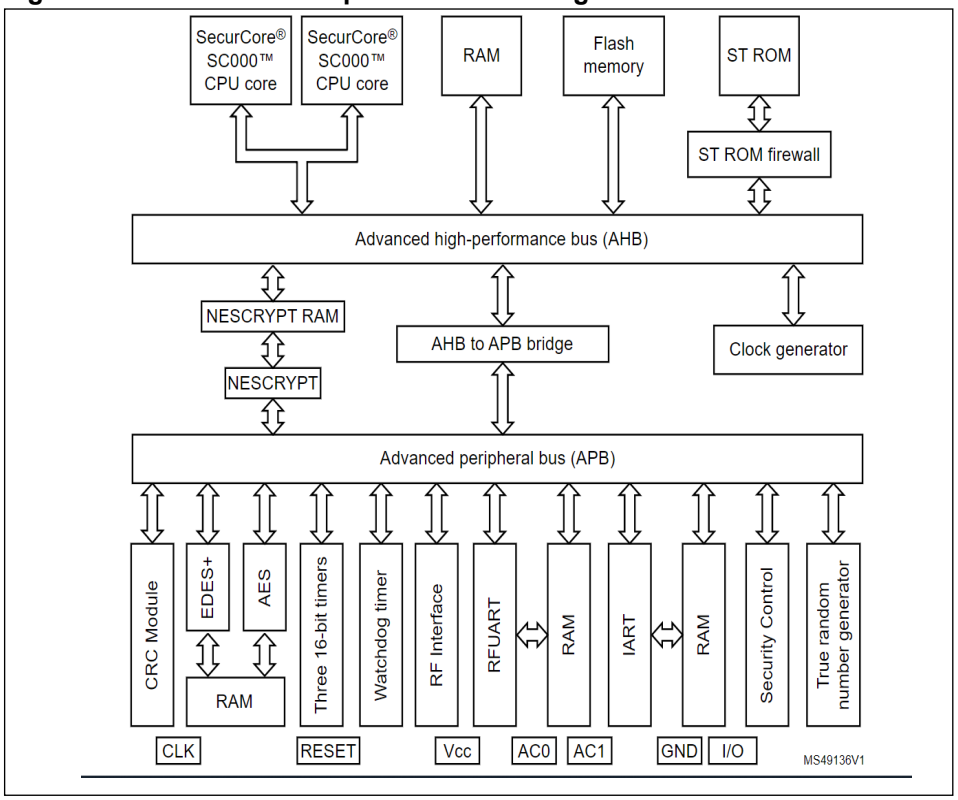
33 Three general-purpose timers are available as well as a watchdog timer.

34 The TOE offers a contact serial communication interface fully compatible with the ISO/IEC 7816-3 standard, and a contactless interface including an RF Universal Asynchronous Receiver Transmitter (RF UART), enabling communication up to 848 Kbits/s compatible with the ISO/IEC 14443 Type A and PayPass™ standard.
These interfaces can be used simultaneously (dual mode), or the contact interface can be deactivated (see *Table 2: Derivative devices configuration possibilities*).

35 The detailed features of this TOE are described in the Data Sheet and in the Cortex SC000 Technical Reference Manual, referenced in *Table 15*.

36 *Figure 1* provides an overview of the ST31P450 A09 platform.

Figure 1. ST31P450 A09 platform block diagram



1.6.2 TOE software description

37 The OST ROM contains a Dedicated Software which provides full test capabilities (operating system for test, called "OST"), not accessible by the Security IC Embedded Software (ES), after TOE delivery.

38 The System ROM and ST NVM of the TOE contain a Dedicated Software (Firmware) which provides:

- a Secure Flash Loader, enabling to securely and efficiently download the Security IC Embedded Software (ES) into the NVM. It also allows the evaluator to load software into the TOE for test purpose. The Secure Flash Loader is available in Admin configuration. The customer can choose to activate it in any phase of the product life-cycle under highly secured conditions, or to deactivate it definitely at a certain step.
- low-level functions called Flash Drivers, enabling the Security IC Embedded Software (ES) to modify and manage the NVM contents. The Flash Drivers are available in User configuration.
- a set of protected commands for device testing and product profiling, not intended for the Security IC Embedded Software (ES) usage, and not available in User configuration.
- a very reduced set of uncritical commands for basic diagnostic purpose (field return analysis), only reserved to STMicroelectronics.
- a set of highly protected commands for secure diagnostic purpose (advanced quality investigations), that can only be activated by the customer and be operated by STMicroelectronics on its own audited sites. This feature is protected by specific strong

access control, completed by environmental measures which prevent access to customer assets. Furthermore, it can be permanently deactivated by the customer.

39 The Security IC Embedded Software (ES) is in User NVM.

40 **Note**: The ES is not part of the TOE and is out of scope of the evaluation.

1.6.3 TOE documentation

41 The user guidance documentation, part of the TOE, consists of:

- the product Data Sheet and die description,
- the product family Security Guidance,
- the AIS31 user manuals,
- the product family programming manual,
- the ARM SC000 Technical Reference Manual,
- the Firmware user manual,
- the Flash loader installation guide.

42 The complete list of guidance documents is detailed in *Table 15*.

1.6.4 Delivery format and method

43 The ST31P is delivered in forms of wafers, micromodules or packages. It is shipped to the customer with monitoring of the delivery activity.
The firmware is integrated on the IC before delivery.

44 Guidance documents in pdf format have a reference identifier. Each delivery is registered and done encrypted for each customer by email or using a secure file transfer system.

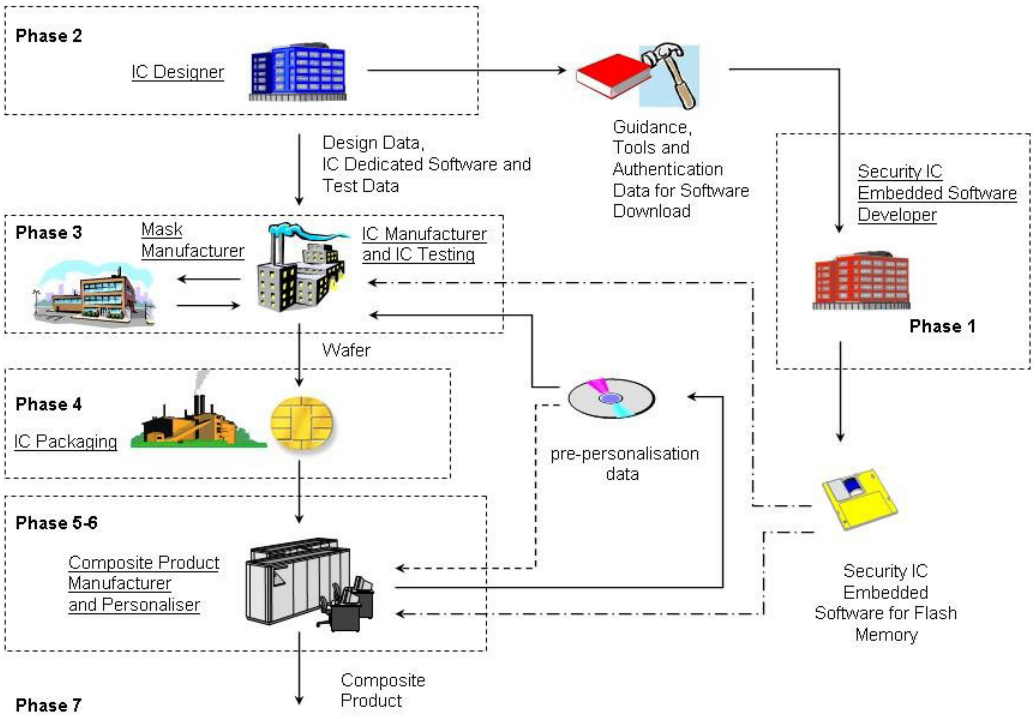
45 All the possible forms of delivery are equivalent from a security point of view.

1.7 TOE life cycle

46 This Security Target is fully conform to the claimed PP. In the following, just a summary and some useful explanations are given. For complete details on the TOE life cycle, please refer to the *Eurosmart - Security IC Platform Protection Profile with Augmentation Packages* (*BSI-CC-PP-0084-2014*), section 1.2.3.

47 The composite product life cycle is decomposed into 7 phases. Each of these phases has the very same boundaries as those defined in the claimed Protection Profile.

Figure 2. Security IC Life-Cycle



48 The life cycle phases are summarized in *Table 3*.

49 The sites potentially involved in the TOE life cycle are listed in *Table 16*.

50 The limit of the evaluation corresponds to phases 2, 3 and optionally 4, including the delivery and verification procedures of phase 1, and the TOE delivery either to the IC packaging manufacturer or to the composite product integrator ; procedures corresponding to phases 1, 5, 6 and 7 are outside the scope of this evaluation.

51 In the following, the term "Composite product manufacturing" is uniquely used to indicate phases 1, optionally 4, 5 and 6 all together.
This ST also uses the term "Composite product manufacturer" which includes all roles responsible of the TOE during phases 1, optionally 4, 5 and 6.

52 The TOE is delivered after Phase 3 in form of wafers or after Phase 4 in packaged form, depending on the customer's order.

53 In the following, the term "TOE delivery" is uniquely used to indicate:

- after Phase 3 (or before Phase 4) if the TOE is delivered in form of wafers or sawn wafers (dice) or
- after Phase 4 (or before Phase 5) if the TOE is delivered in form of packaged products.

54 The TOE is delivered in Admin (aka Issuer) or User configuration.

Table 3. Composite product life cycle phases

Phase	Name	Description
1	Security IC embedded software development	security IC embedded software development specification of IC pre-personalization requirements
2	IC development	IC design IC dedicated software development
3	IC manufacturing and testing	integration and photomask fabrication IC manufacturing IC testing IC pre-personalisation
4	IC packaging	security IC packaging (and testing) pre-personalisation if necessary
5	Security IC product finishing process	composite product finishing process composite product testing
6	Security IC personalisation	composite product personalisation composite product testing
7	Security IC end usage	composite product usage by its issuers and consumers

1.8 TOE environment

55 Considering the TOE, three types of environments are defined:

- Development environment corresponding to phase 2,
- Production environment corresponding to phase 3 and optionally 4,
- Operational environment, including phase 1 and from phase 4 or 5 to phase 7.

1.8.1 TOE Development Environment (Phase 2)

56 To ensure security, the environment in which the development takes place is secured with controllable accesses having traceability. Furthermore, all authorised personnel involved fully understand the importance and the strict implementation of defined security procedures.

57 The development begins with the TOE's specification. All parties in contact with sensitive information are required to abide by Non-Disclosure Agreements.

58 Design and development of the IC then follows, together with the dedicated and engineering software and tools development. The engineers use secure computer systems (preventing unauthorised access) to make their developments, simulations, verifications and generation of the TOE's databases. Sensitive documents, files and tools, databases on tapes, and printed circuit layout information are stored in appropriate locked cupboards/safe. Of paramount importance also is the disposal of unwanted data (complete electronic erasures) and documents (e.g. shredding).

59 The development centres possibly involved in the development of the TOE are denoted by the activity “DEV” in *Table 16*.

60

1.8.2 TOE production environment

61 As high volumes of product commonly go through such environments, adequate control procedures are necessary to account for all product at all stages of production.

Phase 3

62 Reticules and photomasks are generated from the verified IC databases; the former are used in the silicon Wafer-fab processing. As reticules and photomasks are generated off-site, they are transported and worked on in a secure environment. During the transfer of sensitive data electronically, procedures are established to ensure that the data arrive only at the destination and are not accessible at intermediate stages (e.g. stored on a buffer server where system administrators make backup copies).

63 The authorized sub-contractors potentially involved in the TOE mask manufacturing are denoted by the activity “MASK” in *Table 16*.

64 Production starts within the Wafer-fab; here the silicon wafers undergo the diffusion processing. Computer tracking at wafer level throughout the process is commonplace. The wafers are then taken into the test area. Testing and pre-personalization of each TOE occurs to assure conformance with the device specification and to load the customer information.

65 The authorized front-end plant possibly involved in the manufacturing of the TOE are denoted by the activity “FE” in *Table 16*.

66 The authorized EWS plant potentially involved in the testing of the TOE are denoted by the activity “EWS” in *Table 16*.

67 Wafers are then scribed and broken such as to separate the functional from the non-functional ICs. The latter is discarded in a controlled accountable manner.

Phase 4

68 The good ICs are then packaged in phase 4, in a back-end plant. When testing, programming or deliveries are done offsite, ICs are transported and worked on in a secure environment with accountability and traceability of all (good and bad) products.

69 When the product is delivered after phase 4, the authorized back-end plants possibly involved in the packaging of the TOE are denoted by the activity “BE” in *Table 16*.

70 All sites denoted by the activity “WHS” or “WHSD” in *Table 16* can be involved for the logistics during phase 3 or 4.

1.8.3 TOE operational environment

71 A TOE operational environment is the environment of phases 1, optionally 4, then 5 to 7.

72 At phases 1, 4, 5 and 6, the TOE operational environment is a controlled environment.

73 End-user environments (phase 7): composite products are used in a wide range of applications to assure authorised conditional access. Examples of such are pay-TV, banking cards, brand protection, portable communication SIM cards, health cards, transportation cards, access management, identity and passport cards. The end-user environment therefore covers a wide range of very different functions, thus making it difficult to avoid and monitor any abuse of the TOE.

2 Conformance claims (ASE_CCL, ASE_ECD)

2.1 Common Criteria conformance claims

74 The ST31P450 A09 platform Security Target claims to be conformant to the Common Criteria 2022 revision 1.

More precisely the ST31P450 A09 platform Security Target is:

• CC Part 2 extended, where *CCMB-2022-11-002 R1* is extended with FAU_SAS.1, and,

75 • CC Part 3 conformant, cf. *CCMB-2022-11-003 R1* and,

76 • CC Part 5 conformant, cf. *CCMB-2022-11-005 R1* with,

77 • Errata and Interpretation for CC:2022 (Release 1) and CEM:2022 (Release 1), cf. *CCMB Reference*.

2.2 Package Claims

2.2.1 Assurance package claims

78 EAL packages are described in *CCMB-2022-11-005 R1*.

79 The assurance level for the ST31P450 A09 platform Security Target is ***EAL5*** augmented by ASE_TSS.2, ALC_DVS.2, ALC_FLR.2 and AVA_VAN.5.

80 Some of the SARs are refined as required by the *BSI-CC-PP-0084-2014*.

2.3 PP Claims

81 The ST31P450 A09 platform Security Target claims strict conformance to the *Eurosmart - Security IC Platform Protection Profile with Augmentation Packages* (*BSI-CC-PP-0084-2014*), for the part of the TOE covered by this PP (Security IC), as required by this Protection Profile.

82 The following packages have been selected from the *BSI-CC-PP-0084-2014*:

- Package “Authentication of the Security IC”,
- Packages for Loader:
  - Package 1: Loader dedicated for usage in Secured Environment only,

83 Package 2: Loader dedicated for usage by authorized users only.

84 The main additions operated on the *BSI-CC-PP-0084-2014* are:

- Addition #4: “Area based Memory Access Control” from *AUG*,
- Addition #1: “Support of Cipher Schemes” from *AUG*,
- Specific additions for the Secure Flash Loader, to comply with *JIL-CC-SRFPDCL* and *ANSSI-CC-CER/F/06.002*,
- Specific additions for the Secure Diagnostic capability,
- Refinement of assurance requirements.

85 All refinements are indicated with type setting text ***as indicated here***, original text from the *BSI-CC-PP-0084-2014* being typeset as indicated here and ~~here~~. Text originating in *AUG* is

typeset as indicated here. Text originating in *JIL-CC-SRFPDCL* and *ANSSI-CC-CER/F/06.002* is typeset as indicated here.

86 The security environment additions relative to the PP are summarized in *Table 5*.

87 The additional security objectives relative to the PP are summarized in *Table 6*.

88 A simplified presentation of the TOE Security Policy (TSP) is added.

89 The additional SFRs for the TOE relative to the PP are summarized in *Table 8*.

90 The additional SARs relative to the PP are summarized in *Table 10*.

2.3.1 PP Claims rationale

91 The differences between this Security Target security objectives and requirements and those of *BSI-CC-PP-0084-2014*, to which conformance is claimed, have been identified and justified in *Section 4* and in *Section 5*. They have been recalled in the previous section.

92 In the following, the statements of the security problem definition, the security objectives, and the security requirements are consistent with those of the *BSI-CC-PP-0084-2014*.

93 The security problem definition presented in *Section 3*, clearly shows the additions to the security problem statement of the PP.

94 The security objectives rationale presented in *Section 4.3* clearly identifies modifications and additions made to the rationale presented in the *BSI-CC-PP-0084-2014*.

95 Similarly, the security requirements rationale presented in *Section 6.4* has been updated with respect to the Protection Profile.

96 All PP requirements have been shown to be satisfied in the extended set of requirements whose completeness, consistency and soundness have been argued in the rationale sections of the present document.

2.3.2 Rationale regarding CC:2022

97 The SFRs defined in *BSI-CC-PP-0084-2014*, including the functional packages, are conformant to the CC version 3.1. Since this Security Target conforms to the CC:2022, the SFRs have been updated to both comply with CC:2022 and meet *BSI-CC-PP-0084-2014*.

The *Table 4* provides the rationale of the changes.

Table 4. CC:2022 rationale

SFR	*BSI-CC-PP-0084-2014* and *CCMB-2017-04-002 R5* definition	*CCMB-2022-11-002 R1* definition	Change
FMT_LIM.1	The TSF shall be designed and implemented in a manner that limits its capabilities so that in conjunction with "Limited availability (FMT_LIM.2)" the following policy is enforced [assignment: Limited capability policy].	The TSF shall limit its capabilities so that in conjunction with "Limited availability (FMT_LIM.2)" the following policy is enforced [assignment: Limited capability and availability policy].	The CC:2022 definition modifies the wording of the SFR to emphasize that the TSF shall limit its capabilities. The new SFR modifies the assignment to limit availability. The CC:2022 version explicitly links the limited capability and limited availability policies, not only at the level of the dependencies. Any instantiation to the CC:2022 SFR meets the CC3.1 SFR.
FMT_LIM.2	The TSF shall be designed in a manner that limits its availability so that in conjunction with "Limited capabilities (FMT_LIM.1)" the following policy is enforced [assignment: Limited availability policy].	The TSF shall be designed in a manner that limits its availability so that in conjunction with "Limited capabilities (FMT_LIM.1)" the following policy is enforced [assignment: Limited capability and availability policy].	The new SFR modifies the assignment to limit capability. The CC:2022 version explicitly links the limited capability and limited availability policies, not only at the level of the dependencies. Any instantiation to the CC:2022 SFR meets the CC3.1 SFR.
FDP_SDC.1	The TSF shall ensure the confidentiality of the information of the user data while it is stored in the [assignment: *memory area*].	The TSF shall ensure the confidentiality of [selection: *all user data, the following user data* [assignment: *list of user data*]] while it is stored in the [selection: *temporary memory, persistent memory, any memory*].	The new SFR provides the option to select the type of data and memory type. Any instantiation to the CC:2022 SFR meets the CC3.1 SFR.

Table 4. CC:2022 rationale (continued)

SFR	*BSI-CC-PP-0084-2014* and *CCMB-2017-04-002 R5* definition	*CCMB-2022-11-002 R1* definition	Change
FIA_API.1	The TSF shall provide a [assignment: *authentication mechanism*] to prove the identity of the [selection: *TOE,* [assignment: *object, authorized user or role*]] to an external entity.	The TSF shall provide an [assignment: *authentication mechanism*] to prove the identity of [assignment: *entity*] by including the following properties [assignment: *list of properties*] to an external entity.	A selection is replaced by an assignment: the SFR in CC:2022 is more flexible than in CC 3.1. Nevertheless, the instantiation made in this Security Target meets the SFR defined in the PP.
FAU_SAR.1	The TSF shall provide [assignment: *authorised users*] with the capability to read [assignment: *list of audit information*] from the audit records.	The TSF shall provide [assignment: *authorized users*] with the capability to read [assignment: *list of audit information*] from the audit data.	The new definition changes the term "record" with the term "data". The change does not have any impact.
	The TSF shall provide the audit records in a manner suitable for the user to interpret the information.	The TSF shall provide the audit data in a manner suitable for the user to interpret the information.	
FCS_RNG.1	The TSF shall provide a [selection: *physical, hybrid physical, hybrid deterministic*] random number generator that implements: [assignment: *list of security capabilities*].	The TSF shall provide a [selection: *physical, nonphysical* true, deterministic, hybrid physical, hybrid *deterministic*] random number generator that implements: [assignment: *list of security capabilities*].	The first selection add the terms “non physical true” and “deterministic”. The change does not have any impact.
	The TSF shall provide [selection: *bits, octets of bits,* numbers [assignment: format *of the numbers]*] that meet [assignment: *a defined quality metric*].	The TSF shall provide [selection: *bits, octets of bits, numbers* [assignment: *format of the numbers*]] that meet [assignment: *a defined quality metric*].	

Table 4. CC:2022 rationale (continued)

SFR	*BSI-CC-PP-0084-2014* and *CCMB-2017-04-002 R5* definition	*CCMB-2022-11-002 R1* definition	Change
FCS_CKM.4	The TSF shall destroy cryptographic keys in accordance with a specified cryptographic key destruction method [assignment: cryptographic key destruction *method*] that meets the following: [assignment: *list of standards*].	Removed SFR.	FCS_CKM.6 is replacing FCS_CKM.4. FCS_COP.1 has a dependency on FCS_CKM.6. FCS_CKM.6 in CC:2022 is more flexible than FCS_CKM.4 in CC 3.1. Nevertheless, although no instantiation is made in this Security Target, the dependency is discussed later and this change has no impact.
FCS_CKM.6	Not present.	The TSF shall destroy [assignment: *list of* cryptographic keys (including *keying material)*] when [selection: *no longer* needed, [assignment: other circumstances for key or keying material destruction]].	
		The TSF shall destroy cryptographic keys and keying material specified by FCS_CKM.6.1 in accordance with a specified cryptographic key destruction method [assignment: cryptographic key destruction *method*] that meets the following: [assignment: *list of standards*].	

3 Security problem definition (ASE_SPD)

98 This section describes the security aspects of the environment in which the TOE is intended to be used and addresses the description of the assets to be protected, the threats, the organisational security policies and the assumptions.

99 Note that the origin of each security aspect is clearly identified in the prefix of its label. Most of these security aspects can therefore be easily found in the *Eurosmart - Security IC Platform Protection Profile with Augmentation Packages* (*BSI-CC-PP-0084-2014*), section 3. Only those originating in *AUG* or in *JIL-CC-SRFPDCL* / *ANSSI-CC-CER/F/06.002*, and the ones introduced in this Security Target, are detailed in the following sections.

100 A summary of all these security aspects and their respective conditions is provided in *Table 5*.

Table 5. Summary of security aspects

	Label	Title
TOE threats	BSI.T.Leak-Inherent	Inherent Information Leakage
	BSI.T.Phys-Probing	Physical Probing
	BSI.T.Malfunction	Malfunction due to Environmental Stress
	BSI.T.Phys-Manipulation	Physical Manipulation
	BSI.T.Leak-Forced	Forced Information Leakage
	BSI.T.Abuse-Func	Abuse of Functionality
	BSI.T.RND	Deficiency of Random Numbers
	BSI.T.Masquerade-TOE	Masquerade the TOE
	AUG4.T.Mem-Access	Memory Access Violation
	JIL.T.Open-Samples-Diffusion	Diffusion of open samples
OSPs	BSI.P.Process-TOE	Protection during TOE Development and Production
	BSI.P.Lim-Block-Loader	Limiting and blocking the loader functionality
	BSI.P.Ctrl-Loader	Controlled usage to Loader Functionality
	AUG1.P.Add-Functions	Additional Specific Security Functionality (Cipher Scheme Support)
Assumptions	BSI.A.Process-Sec-IC	Protection during Packaging, Finishing and Personalisation
	BSI.A.Resp-Appl	Treatment of User Data

3.1 Description of assets

101 Since this Security Target claims strict conformance to the *Eurosmart - Security IC Platform Protection Profile with Augmentation Packages* (*BSI-CC-PP-0084-2014*), the assets defined in section 3.1 of the Protection Profile are applied and the assets regarding threats are clarified in this Security Target.

102 The assets regarding the threats are:

- logical design data, physical design data, IC Dedicated Software, and configuration data,
- Initialisation data and pre-personalisation data, specific development aids, test and characterisation related data, material for software development support, and photomasks and product in any form,
- the TOE correct operation,
- the Security IC Embedded Software, stored in the TOE's protected memories and in operation,
- the security services provided by the TOE for the Security IC Embedded Software,
- the cryptographic co-processors for Triple-DES and AES, the random number generator,
- the TSF Data.

103 Application note:
The TOE providing a functionality for Security IC Embedded Software secure loading into NVM, the ES is considered as User Data being stored in the TOE's memories at this step, and the Protection Profile corresponding packages are integrated, as well as the requirements from *JIL-CC-SRFPDCL*.

3.2 Threats

104 The threats are described in the *BSI-CC-PP-0084-2014*, section 3.2.
Only those originating in *AUG* and *ANSSI-CC-CER/F/06.002* are detailed in the following section.

BSI.T.Leak-Inherent	Inherent Information Leakage
BSI.T.Phys-Probing	Physical Probing
BSI.T.Malfunction	Malfunction due to Environmental Stress
BSI.T.Phys-Manipulation	Physical Manipulation
BSI.T.Leak-Forced	Forced Information Leakage
BSI.T.Abuse-Func	Abuse of Functionality
BSI.T.RND	Deficiency of Random Numbers
BSI.T.Masquerade-TOE	Masquerade the TOE

AUG4.T.Mem-Access Memory Access Violation:

Parts of the ***Security IC*** Embedded Software may cause security violations by accidentally or deliberately accessing restricted data (which may include code). Any restrictions are defined by the security policy of the specific application context and must be implemented by the ***Security IC*** Embedded Software.

Clarification: This threat does not address the proper definition and management of the security rules implemented by the Security IC Embedded Software, this being a software design and correctness issue. This threat addresses the reliability of the abstract machine targeted by the software implementation. To avert the threat, the set of access rules provided by this TOE should be undefeated if operated according to the provided guidance. The threat is not realized if the Security IC Embedded Software is designed or implemented to grant access to restricted information. It is realized if an implemented access denial is granted under unexpected conditions or if the execution machinery does not effectively control a controlled access.

Here the attacker is expected to (i) take advantage of flaws in the design and/or the implementation of the TOE memory access rules (refer to BSI.T.Abuse-Func but for functions available after TOE delivery), (ii) introduce flaws by forcing operational conditions (refer to BSI.T.Malfunction) and/or by physical manipulation (refer to BSI.T.Phys-Manipulation). This attacker is expected to have a high level potential of attack.

JIL.T.Open-Samples-Diffusion Diffusion of open samples:

An attacker may get access to open samples of the TOE and use them to gain information about the TSF (loader, memory management unit, ROM code, …). He may also use the open samples to characterize the behavior of the IC and its security functionalities (for example: characterization of side channel profiles, perturbation cartography, …). The execution of a dedicated security features (for example: execution of a DES computation without countermeasures or by de-activating countermeasures) through the loading of an adequate code would allow this kind of characterization and the execution of enhanced attacks on the IC.

3.3 Organisational security policies

105 The TOE provides specific security functionality that can be used by the ***Security IC*** Embedded Software. In the following specific security functionality is listed which is not derived from threats identified for the TOE's environment because it can only be decided in the context of the ***Security IC*** application, against which threats the ***Security IC*** Embedded Software will use the specific security functionality.

106 ST applies the Protection policy during TOE Development and Production (*BSI.P.Process-TOE*) as specified below.

107 *BSI.P.Lim-Block-Loader* and *BSI.P.Ctrl-Loader* are dedicated to the Secure Flash Loader, and described in the *BSI-CC-PP-0084-2014* packages “Loader dedicated for usage in secured environment only” and “Loader dedicated for usage by authorized users only”. *BSI.P.Ctrl-Loader* has been completed in accordance with *JIL-CC-SRFPDCL*.

108 ***ST*** applies the Additional Specific Security Functionality policy (*AUG1.P.Add-Functions*) as specified below.

BSI.P.Process-TOE Identification during TOE Development and Production:

An accurate identification ***is*** established for the TOE. This requires that each instantiation of the TOE carries this unique identification.

BSI.P.Lim-Block-Loader Limiting and blocking the loader functionality:

The composite manufacturer uses the Loader for loading of Security IC Embedded Software, user data of the Composite Product or IC Dedicated Support Software in charge of the IC Manufacturer. He limits the capability and blocks the availability of the Loader(1) in order to protect stored data from disclosure and manipulation.

1. Note that blocking the Loader is not required, as only authorized users can use the Loader as stated in BSI.P.Ctrl-Loader.

BSI.P.Ctrl-Loader Controlled usage to Loader Functionality:

Authorized user controls the usage of the Loader functionality in order to protect stored and loaded user data from disclosure and manipulation.

The activation of the loaded Additional ~~Code~~ ***user data*** is possible if:

– integrity and authenticity of the Additional ~~Code~~ ***user data*** have been successfully checked;

– the loaded ~~Additional Code~~ ***user data*** is targeted to the Initial TOE (Identification ~~Data~~ of the Additional ~~Code~~ ***user data*** and the Initial TOE will be used for this check).

Identification ~~Data~~ of the resulting Final TOE shall identify the Initial TOE and the ~~activated~~ Additional ~~Code~~ ***user data***. Identification Data shall be protected in integrity.

Note: Here, the term TOE denotes the TOE itself as well as the composite TOE which both may be maintained by loading of data.

AUG1.P.Add-Functions Additional Specific Security Functionality:

The TOE shall provide the following specific security functionality to the Security IC Embedded Software:

– Triple Data Encryption Standard (TDES),

– Advanced Encryption Standard (AES).

3.4 Assumptions

109 The following assumptions are described in the *BSI-CC-PP-0084-2014*, section 3.4.

BSI.A.Process-Sec-IC	Protection during Packaging, Finishing and Personalisation
BSI.A.Resp-Appl	Treatment of User Data of the Composite TOE

4 Security objectives (ASE_OBJ)

110 The security objectives of the TOE cover principally the following aspects:

- integrity and confidentiality of assets,
- protection of the TOE and associated documentation during development and production phases,
- provide random numbers,
- provide cryptographic support and access control functionality.

111 A summary of all security objectives is provided in *Table 6*.

112 Note that the origin of each objective is clearly identified in the prefix of its label. Most of these security aspects can therefore be easily found in the *BSI-CC-PP-0084-2014*, sections 4.1 and 7.3. Only those which have been amended, those originating in *AUG*, those originating in *JIL-CC-SRFPDCL*, and the ones introduced in this Security Target, are detailed in the following sections.

Table 6. Summary of security objectives

	Label	Title
TOE	BSI.O.Leak-Inherent	Protection against Inherent Information Leakage
	BSI.O.Phys-Probing	Protection against Physical Probing
	BSI.O.Malfunction	Protection against Malfunctions
	BSI.O.Phys-Manipulation	Protection against Physical Manipulation
	BSI.O.Leak-Forced	Protection against Forced Information Leakage
	BSI.O.Abuse-Func	Protection against Abuse of Functionality
	BSI.O.Identification	TOE Identification
	BSI.O.RND	Random Numbers
	BSI.O.Cap-Avail-Loader	Capability and Availability of the Loader
	BSI.O.Ctrl-Auth-Loader	Access control and authenticity for the Loader
	JIL.O.Prot-TSF-Confidentiality	Protection of the confidentiality of the TSF
	JIL.O.Secure-Load-ACode	Secure loading of the Additional Code
	JIL.O.Secure-AC-Activation	Secure activation of the Additional Code
	JIL.O.TOE-Identification	Secure identification of the TOE
	O.Secure-Load-AMemImage	Secure loading of the Additional Memory Image
	O.MemImage-Identification	Secure identification of the Memory Image
	BSI.O.Authentication	Authentication to external entities
	AUG1.O.Add-Functions	Additional Specific Security Functionality
	AUG4.O.Mem-Access	Area based Memory Access Control

Table 6. Summary of security objectives (continued)

	Label	Title
Environments	BSI.OE.Resp-Appl	Treatment of User Data of the Composite TOE
	BSI.OE.Process-Sec-IC	Protection during composite product manufacturing
	BSI.OE.Lim-Block-Loader	Limitation of capability and blocking the Loader
	BSI.OE.Loader-Usage	Secure communication and usage of the Loader
	BSI.OE.TOE-Auth	External entities authenticating of the TOE
	OE.Composite-TOE-Id	Composite TOE identification
	OE.TOE-Id	TOE identification
	OE.Enable-Disable-Secure-Diag	Enabling or disabling the Secure Diagnostic
	OE.Secure-Diag-Usage	Secure communication and usage of the Secure Diagnostic

4.1 Security objectives for the TOE

BSI.O.Leak-Inherent	Protection against Inherent Information Leakage
BSI.O.Phys-Probing	Protection against Physical Probing
BSI.O.Malfunction	Protection against Malfunctions
BSI.O.Phys-Manipulation	Protection against Physical Manipulation
BSI.O.Leak-Forced	Protection against Forced Information Leakage
BSI.O.Abuse-Func	Protection against Abuse of Functionality
BSI.O.Identification	TOE Identification
BSI.O.RND	Random Numbers
BSI.O.Cap-Avail-Loader	Capability and Availability of the Loader
BSI.O.Ctrl-Auth-Loader	Access control and authenticity for the Loader
BSI.O.Authentication	Authentication to external entities
JIL.O.Prot-TSF-Confidentiality	Protection of the confidentiality of the TSF: The TOE must provide protection against disclosure of confidential operations of the Security IC (loader, memory management unit, …) through the use of a dedicated code loaded on open samples.

JIL.O.Secure-Load-ACode	Secure loading of the Additional Code: The Loader of the ~~Initial~~ TOE shall check an evidence of authenticity and integrity of the loaded Additional Code. The Loader enforces that only the allowed version of the Additional Code can be loaded on the Initial TOE. The Loader shall forbid the loading of an Additional Code not intended to be assembled with the Initial TOE. During the Load Phase of an Additional Code, the TOE shall remain secure. Note: Concretely, the TOE manages the Additional Code as a Memory Image.
JIL.O.Secure-AC-Activation	Secure activation of the Additional Code: Activation of the Additional Code and update of the Identification Data shall be performed at the same time in an Atomic way. All the operations needed for the code to be able to operate as in the Final TOE shall be completed before activation. If the Atomic Activation is successful, then the resulting product is the Final TOE, otherwise (in case of interruption or incident which prevents the forming of the Final TOE), the Initial TOE shall remain in its initial state or fail secure.
JIL.O.TOE-Identification	Secure identification of the TOE: The Identification Data identifies the Initial TOE and Additional Code. The TOE provides means to store Identification Data in its non-volatile memory and guarantees the integrity of these data. After Atomic Activation of the Additional Code, the Identification Data of the Final TOE allows identifications of Initial TOE and Additional TOE. The user shall be able to uniquely identify Initial TOE and Additional Code(s) which are embedded in the Final TOE.
O.Secure-Load-AMemImage	Secure loading of the Additional Memory Image: The Loader of the TOE shall check an evidence of authenticity and integrity of the loaded Memory Image. The Loader enforces that only the allowed version of the Additional Memory Image can be loaded after the Initial Memory Image. The Loader shall forbid the loading of an Additional Memory Image not intended to be assembled with the Initial Memory Image. Note: This objective is similar to JIL.O.Secure-Load-ACode, applied to user data (e.g. embedded software).

O.MemImage-Identification	Secure identification of the Memory Image: The Identification Data identifies the Initial Memory Image and Additional Memory Image. The TOE provides means to store Identification Data in its non-volatile memory and guarantees the integrity of these data. Storage of the Additional Memory Image and update of the Identification Data shall be performed at the same time in an Atomic way, otherwise (in case of interruption or incident which prevents this alignment), the Memory Image shall remain in its initial state or the TOE shall fail secure. The Identification Data of the Final Memory Image allows identifications of Initial Memory Image and Additional Memory Image. Note: This objective is similar to JIL.O.Secure-AC-Activation and JIL.O.TOE-Identification, applied to user data (e.g. embedded software).
AUG1.O.Add-Functions	Additional Specific Security Functionality: The TOE must provide the following specific security functionality to the ***Security IC*** Embedded Software: – Triple Data Encryption Standard (TDES), – Advanced Encryption Standard (AES).
AUG4.O.Mem-Access	Area based Memory Access Control: The TOE must provide the ***Security IC*** Embedded Software with the capability to define access memory areas. The TOE must then enforce the partitioning of such memory areas so that access of software to memory areas is controlled as required, for example, in a multi-application environment.

4.2 Security objectives for the environment

113 Security Objectives for the Security IC Embedded Software development environment (phase 1):

BSI.OE.Resp-Appl	Treatment of User Data of the Composite TOE

114 Clarification related to “Treatment of User Data of the Composite TOE (*BSI.OE.Resp-Appl*)”: By definition cipher or plain text data and cryptographic keys are User Data. The Security IC Embedded Software shall treat these data appropriately, use only proper secret keys (chosen from a large key space) as input for the cryptographic function of the TOE and use keys and functions appropriately in order to ensure the strength of cryptographic operation. This means that keys are treated as confidential as soon as they are generated. The keys must be unique with a very high probability, as well as cryptographically strong. If keys are imported into the TOE and/or derived from other keys, quality and confidentiality must be maintained. This implies that appropriate key management has to be realized in the environment.

115 Security Objectives for the operational Environment (phase 4 up to 7):

BSI.OE.Process-Sec-IC	Protection during composite product manufacturing	Up to phase 6
BSI.OE.Lim-Block-Loader	Limitation of capability and blocking the Loader: The Composite Product Manufacturer will protect the Loader functionality against misuse, limit the capability of the Loader and, ***if desired,*** terminate irreversibly the Loader after intended usage of the Loader. Note that blocking the Loader is not required, as only authorized users can use the Loader as stated in BSI.P.Ctrl-Loader.	Up to phase 6
BSI.OE.Loader-Usage	Secure communication and usage of the Loader: The authorized user must support the trusted communication channel with the TOE by confidentiality protection and authenticity proof of the data to be loaded and fulfilling the access conditions required by the Loader. The authorized user must organize the maintenance transactions to ensure that the additional code (loaded as data) is able to operate as in the Final composite TOE. The authorized user must manage and associate unique Identification to the loaded data.	Up to phase 7
BSI.OE.TOE-Auth	External entities authenticating of the TOE The operational environment shall support the authentication verification mechanism and know authentication reference data of the TOE.	Up to phase 7
OE.Composite-TOE-Id	Composite TOE identification: The composite manufacturer must maintain a unique identification of a composite TOE under maintenance.	Up to phase 7
OE.TOE-Id	TOE identification: The IC manufacturer must maintain a unique identification of the TOE under maintenance.	Up to phase 7

OE.Enable-Disable-Secure-Diag	Enabling or disabling the Secure Diagnostic: If desired, the Composite Product Manufacturer will enable (or disable) irreversibly the Secure Diagnostic capability, thus enabling the IC manufacturer (or disabling everyone) to exercise the Secure Diagnostic capability.	Up to phase 7
OE.Secure-Diag-Usage	Secure communication and usage of the Secure Diagnostic: The IC manufacturer must support the trusted communication channel with the TOE by fulfilling the access conditions required by the Secure Diagnostic. The IC manufacturer must manage the Secure Diagnostic transactions so that they cannot be used to disclose critical user data of the Composite TOE, manipulate critical user data of the Composite TOE, manipulate Security IC Embedded Software or bypass, deactivate, change or explore security features or security services of the TOE	Up to phase 7

4.3 Security objectives rationale

116 The main line of this rationale is that the inclusion of all the security objectives of the *BSI-CC-PP-0084-2014* Protection Profile, together with those in *AUG*, and those introduced in this ST, guarantees that all the security environment aspects identified in *Section 3* are addressed by the security objectives stated in this chapter.

117 Thus, it is necessary to show that:

- security environment aspects from *AUG* and from this ST, are addressed by security objectives stated in this chapter,
- security objectives from *AUG* and from this ST, are suitable (i.e. they address security environment aspects),
- security objectives from *AUG* and from this ST, are consistent with the other security objectives stated in this chapter (i.e. no contradictions).

118 The selected augmentations from *AUG* introduce the following security environment aspects:

- TOE threat "Memory Access Violation, (*AUG4.T.Mem-Access*)",
- organisational security policy "Additional Specific Security Functionality, (*AUG1.P.Add-Functions*)".

119 The augmentation made in this ST introduces the following security environment aspect:

- TOE threats "Diffusion of open samples, (*JIL.T.Open-Samples-Diffusion*)".

120 The justification of the additional policies, additional threats, provided in the next subsections shows that they do not contradict to the rationale already given in the Protection Profile *BSI-CC-PP-0084-2014* for the assumptions, policies and threats defined there.

Table 7. Security Objectives versus Assumptions, Threats or Policies

Assumption, Threat or Organisational Security Policy	Security Objective	Notes
BSI.A.Resp-Appl	*BSI.OE.Resp-Appl*	Phase 1
BSI.P.Process-TOE	*BSI.O.Identification*	Phase 2-3 optional Phase 4
BSI.A.Process-Sec-IC	*BSI.OE.Process-Sec-IC*	Phase 5-6 optional Phase 4
BSI.P.Lim-Block-Loader	*BSI.O.Cap-Avail-Loader* *BSI.OE.Lim-Block-Loader*	
BSI.P.Ctrl-Loader	*BSI.O.Ctrl-Auth-Loader* *JIL.O.Secure-Load-ACode* *JIL.O.Secure-AC-Activation* *JIL.O.TOE-Identification* *O.Secure-Load-AMemImage* *O.MemImage-Identification* *BSI.OE.Loader-Usage* *OE.TOE-Id* *OE.Composite-TOE-Id*	
AUG1.P.Add-Functions	*AUG1.O.Add-Functions*	
BSI.T.Leak-Inherent	*BSI.O.Leak-Inherent*	
BSI.T.Phys-Probing	*BSI.O.Phys-Probing*	
BSI.T.Malfunction	*BSI.O.Malfunction*	
BSI.T.Phys-Manipulation	*BSI.O.Phys-Manipulation*	
BSI.T.Leak-Forced	*BSI.O.Leak-Forced*	
BSI.T.Abuse-Func	*BSI.O.Abuse-Func* *OE.Enable-Disable-Secure-Diag* *OE.Secure-Diag-Usage*	
BSI.T.RND	*BSI.O.RND*	
BSI.T.Masquerade-TOE	*BSI.O.Authentication* *BSI.OE.TOE-Auth*	
AUG4.T.Mem-Access	*AUG4.O.Mem-Access*	
JIL.T.Open-Samples-Diffusion	*JIL.O.Prot-TSF-Confidentiality* *BSI.O.Leak-Inherent* *BSI.O.Leak-Forced*	

4.3.1 TOE threat "Abuse of Functionality"

121 The justification related to the threat “Abuse of Functionality, (*BSI.T.Abuse-Func*)” is as follows:

122 The threat *BSI.T.Abuse-Func* is directly covered by the security objective *BSI.O.Abuse-Func,* supported by the security objectives for the operational environment *OE.Enable-Disable-Secure-Diag and OE.Secure-Diag-Usage* for the particular case of the Secure Diagnostic. Therefore *BSI.T.Abuse-Func* is covered by these three objectives.

4.3.2 TOE threat "Memory Access Violation"

123 The justification related to the threat “Memory Access Violation, (*AUG4.T.Mem-Access*)” is as follows:

124 According to *AUG4.O.Mem-Access* the TOE must enforce the partitioning of memory areas so that access of software to memory areas is controlled. Any restrictions are to be defined by the ***Security IC*** Embedded Software. Thereby security violations caused by accidental or deliberate access to restricted data (which may include code) can be prevented (refer to *AUG4.T.Mem-Access*). The threat *AUG4.T.Mem-Access* is therefore removed if the objective is met.

125 The added objective for the TOE *AUG4.O.Mem-Access* does not introduce any contradiction in the security objectives for the TOE.

4.3.3 TOE threat "Diffusion of open samples"

126 The justification related to the threat “Diffusion of open samples, (*JIL.T.Open-Samples-Diffusion*)” is as follows:

127 According to threat *JIL.T.Open-Samples-Diffusion*, the TOE shall provide protection against attacks using open samples of the TOE to characterize the behavior of the IC and its security functionalities. The objective *JIL.O.Prot-TSF-Confidentiality* requires protection against disclosure of confidential operations of the Security IC through the use of a dedicated code loaded on open samples. Additionally, *BSI.O.Leak-Inherent* and *BSI.O.Leak-Forced* ensures protection against disclosure of confidential data processed in the Security IC. Therefore *JIL.T.Open-Samples-Diffusion* is covered by these three objectives.

128 The added objective for the TOE *JIL.O.Prot-TSF-Confidentiality* does not introduce any contradiction in the security objectives for the TOE.

4.3.4 Organisational security policy "Controlled usage to Loader Functionality"

129 The justification related to the organisational security policy "Controlled usage to Loader Functionality, (*BSI.P.Ctrl-Loader*)” is as follows:

130 As stated in *BSI-CC-PP-0084-2014*, the organisational security policy “Controlled usage to Loader Functionality (*BSI.P.Ctrl-Loader*) is implemented by the security objective for the TOE “Access control and authenticity for the Loader (*BSI.O.Ctrl-Auth-Loader*)” and the security objective for the TOE environment “Secure communication and usage of the Loader (*BSI.OE.Loader-Usage*)”.
The security objectives “Secure loading of the Additional Code (*JIL.O.Secure-Load-ACode*)”, “Secure activation of the Additional Code (*JIL.O.Secure-AC-Activation*)”, and ”Secure identification of the TOE (*JIL.O.TOE-Identification*)” specified by *JIL-CC-SRFPDCL*

additionally enforce this policy since they require authenticity, atomicity, identification of the loaded additional code, part of the TOE. ”Secure identification of the TOE (*JIL.O.TOE-Identification*)” is supported by the security objective for the TOE environment “TOE identification (*OE.TOE-Id*)”.
Similarly, the security objectives “Secure loading of the Additional Memory Image (*O.Secure-Load-AMemImage*)”, and “Secure identification of the Memory Image (*O.MemImage-Identification*)”, enforce this policy since they require authenticity, atomicity, identification of the loaded additional memory image for the user data (embedded software). ”Secure identification of Memory Image (*O.MemImage-Identification*)” is supported by the security objective for the TOE environment “Composite TOE identification (*OE.Composite-TOE-Id*)”.
Therefore the policy is covered by these nine objectives.

4.3.5 Organisational security policy "Additional Specific Security Functionality"

131 The justification related to the organisational security policy "Additional Specific Security Functionality, (*AUG1.P.Add-Functions*)” is as follows:

132 Since *AUG1.O.Add-Functions* requires the TOE to implement exactly the same specific security functionality as required by *AUG1.P.Add-Functions*, ***and in the very same conditions,*** the organisational security policy is covered by the objective.

133 Nevertheless the security objectives *BSI.O.Leak-Inherent*, *BSI.O.Phys-Probing*, , *BSI.O.Malfunction*, *BSI.O.Phys-Manipulation* and *BSI.O.Leak-Forced* define how to implement the specific security functionality required by *AUG1.P.Add-Functions*. (Note that these objectives support that the specific security functionality is provided in a secure way as expected from *AUG1.P.Add-Functions*.) Especially *BSI.O.Leak-Inherent* and *BSI.O.Leak-Forced* refer to the protection of confidential data (User Data or TSF data) in general. User Data are also processed by the specific security functionality required by *AUG1.P.Add-Functions*.

134 The added objective for the TOE *AUG1.O.Add-Functions* does not introduce any contradiction in the security objectives for the TOE.

5 Extended Components Definition (ASE_ECD)

135 This Security Target uses the extended Security Functional Requirement **FAU_SAS.1** Audit data storage defined in the *Eurosmart - Security IC Platform Protection Profile with Augmentation Packages* (*BSI-CC-PP-0084-2014*).

6 Security requirements (ASE_REQ)

136 This chapter on security requirements contains a section on security functional requirements (SFRs) for the TOE (*Section 6.1*), a section on security assurance requirements (SARs) for the TOE (*Section 6.2*), a section on the refinements of these SARs (*Section 6.3*) as required by the "*BSI-CC-PP-0084-2014*" Protection Profile. This chapter includes a section with the security requirements rationale (*Section 6.4*).

6.1 Security functional requirements for the TOE

137 The Security Functional Requirements (SFRs) that are defined in the "*BSI-CC-PP-0084-2014*" Protection Profile (PP) have been updated to meet *CCMB-2022-11-002 R1* (see *Section 2.3.2*).

138 This Security Target uses the extended component **FAU_SAS.1** Audit data storage defined in the *Eurosmart - Security IC Platform Protection Profile with Augmentation Packages BSI-CC-PP-0084-2014*.

139 All iterations, assignments, selections, or refinements on SFRs have been performed according to section 8.2 of *CCMB-2022-11-001 R1*. They are easily identified in the following text as they appear ***as indicated here***. Note that in order to improve readability, iterations are sometimes expressed within tables.

140 In order to ease the definition and the understanding of these security functional requirements, a simplified presentation of the TOE Security Policy (TSP) is given in the following section.

141 The selected security functional requirements for the TOE, their respective origin and type are summarized in *Table 8*.

Table 8. Summary of functional security requirements for the TOE

Label	Title	Addressing	Origin	Type
FRU_FLT.2	Limited fault tolerance	Malfunction	*BSI-CC-PP-0084-2014*	*CCMB-2022-11-002 R1*
FPT_FLS.1	Failure with preservation of secure state			
FMT_LIM.1 / Test	Limited capabilities	Abuse of Test functionality	*BSI-CC-PP-0084-2014*	
FMT_LIM.2 / Test	Limited availability			

Table 8. Summary of functional security requirements for the TOE (continued)

Label	Title	Addressing	Origin	Type
FAU_SAS.1	Audit storage	Lack of TOE identification	*BSI-CC-PP-0084-2014* Operated	Extended
FDP_SDC.1	Stored data confidentiality	Physical manipulation & probing		*CCMB-2022-11-002 R1*
FDP_SDI.2	Stored data integrity monitoring and action			
FPT_PHP.3	Resistance to physical attack		*BSI-CC-PP-0084-2014*	
FDP_ITT.1	Basic internal transfer protection	Leakage		
FPT_ITT.1	Basic internal TSF data transfer protection			
FDP_IFC.1	Subset information flow control			
FCS_RNG.1	Random number generation	Weak cryptographic quality of random numbers	*BSI-CC-PP-0084-2014* Operated	
FCS_COP.1	Cryptographic operation	Cipher scheme support	*AUG* #1 Operated	
FDP_ACC.1 / Memories	Subset access control	Memory access violation	Security Target Operated	
FDP_ACF.1 / Memories	Security attribute based access control		*AUG* #4 Operated	
FMT_MSA.3 / Memories	Static attribute initialisation	Correct operation		
FMT_MSA.1 / Memories	Management of security attribute			
FMT_SMF.1 / Memories	Specification of management functions		Security Target Operated	
FIA_API.1	Authentication Proof of Identity	Masquerade	*BSI-CC-PP-0084-2014* Operated	

Table 8. Summary of functional security requirements for the TOE (continued)

Label	Title	Addressing	Origin	Type
FMT_LIM.1 / Loader	Limited capabilities	Abuse of Loader functionality	*BSI-CC-PP-0084-2014* Operated	*CCMB-2022-11-002 R1*
FMT_LIM.2 / Loader	Limited availability			
FTP_ITC.1 / Loader	Inter-TSF trusted channel - Loader	Loader violation		
FDP_UCT.1 / Loader	Basic data exchange confidentiality - Loader			
FDP_UIT.1 / Loader	Data exchange integrity - Loader			
FDP_ACC.1 / Loader	Subset access control - Loader			
FDP_ACF.1 / Loader	Security attribute based access control - Loader			
FMT_MSA.3 / Loader	Static attribute initialisation - Loader	Correct Loader operation	Security Target Operated	
FMT_MSA.1 / Loader	Management of security attribute - Loader			
FMT_SMR.1 / Loader	Security roles - Loader			
FIA_UID.1 / Loader	Timing of identification - Loader			
FIA_UAU.1 / Loader	Timing of authentication - Loader			
FMT_SMF.1 / Loader	Specification of management functions - Loader			
FPT_FLS.1 / Loader	Failure with preservation of secure state - Loader			
FAU_SAR.1 / Loader	Audit review - Loader	Lack of TOE identification		
FAU_SAS.1 / Loader	Audit storage - Loader			Extended

Table 8. Summary of functional security requirements for the TOE (continued)

Label	Title	Addressing	Origin	Type
FTP_ITC.1 / Sdiag	Inter-TSF trusted channel - Secure Diagnostic	Abuse of Secure Diagnostic functionality	Security Target Operated	CCMB-2022-11-002 R1
FAU_SAR.1 / Sdiag	Audit review - Secure Diagnostic			
FMT_LIM.1 / Sdiag	Limited capabilities - Secure Diagnostic			
FMT_LIM.2 / Sdiag	Limited availability - Secure Diagnostic			

6.1.1 Security Functional Requirements from the Protection Profile

Limited fault tolerance (FRU_FLT.2)

142 The TSF shall ensure the operation of all the TOE's capabilities when the following failures occur: ***exposure to operating conditions which are not detected according to the requirement Failure with preservation of secure state (FPT_FLS.1).***

Failure with preservation of secure state (FPT_FLS.1)

143 The TSF shall preserve a secure state when the following types of failures occur: ***exposure to operating conditions which may not be tolerated according to the requirement Limited fault tolerance (FRU_FLT.2) and where therefore a malfunction could occur.***

144 ***Refinements:***

The term "failure" above also covers "circumstances". The TOE prevents failures for the "circumstances" defined above.

Regarding application note 14 of BSI-CC-PP-0084-2014, the secure state is reached by an immediate interrupt or by a reset, depending on the current context.

Regarding application note 15 of BSI-CC-PP-0084-2014, the TOE provides information on the operating conditions monitored during Security IC Embedded Software execution and after a warm reset. No audit requirement is however selected in this Security Target.

Limited capabilities (FMT_LIM.1) / Test

145 The TSF shall limit its capabilities so that in conjunction with "Limited availability (FMT_LIM.2)" the following policy is enforced: ***Limited capability and availability Policy / Test***.

Limited availability (FMT_LIM.2) / Test

146 The TSF shall be designed in a manner that limits their availability so that in conjunction with "Limited capabilities (FMT_LIM.1) / Test" the following policy is enforced: ***Limited capability and availability Policy / Test***.

147 *SFP_1: Limited capability and availability Policy / Test*

Deploying Test Features after TOE Delivery does not allow User Data of the Composite TOE to be disclosed or manipulated, TSF data to be disclosed or manipulated, software to

be reconstructed and no substantial information about construction of TSF to be gathered which may enable other attacks.

Audit storage (FAU_SAS.1)

148 The TSF shall provide ***the test process before TOE Delivery*** with the capability to store the ***Initialisation Data and/or Pre-personalisation Data and/or supplements of the Security IC Embedded Software*** in the ***NVM***.

Stored data confidentiality (FDP_SDC.1)

149 The TSF shall ensure the confidentiality of the information of the user data while it is stored in ***all the memory areas where it can be stored***.

Stored data integrity monitoring and action (FDP_SDI.2)

150 The TSF shall monitor user data stored in containers controlled by the TSF for ***integrity errors*** on all objects, based on the following attributes: ***user data stored in all possible memory areas, depending on the integrity control attributes***.

151 Upon detection of a data integrity error, the TSF shall ***signal the error and react***.

Resistance to physical attack (FPT_PHP.3)

152 The TSF shall resist ***physical manipulation and physical probing,*** to the ***TSF*** by responding automatically such that the SFRs are always enforced.

153 ***Refinement:***

The TSF will implement appropriate mechanisms to continuously counter physical manipulation and physical probing. Due to the nature of these attacks (especially manipulation) the TSF can by no means detect attacks on all of its elements. Therefore, permanent protection against these attacks is required ensuring that security functional requirements are enforced. Hence, "automatic response" means here (i)assuming that there might be an attack at any time and (ii)countermeasures are provided at any time.

Basic internal transfer protection (FDP_ITT.1)

154 The TSF shall enforce the ***Data Processing Policy*** to prevent the ***disclosure*** of user data when it is transmitted between physically-separated parts of the TOE.

Basic internal TSF data transfer protection (FPT_ITT.1)

155 The TSF shall protect TSF data from ***disclosure*** when it is transmitted between separate parts of the TOE.

156 ***Refinement:***

The different memories, the CPU and other functional units of the TOE (e.g. a cryptographic co-processor) are seen as separated parts of the TOE.

This requirement is equivalent to FDP_ITT.1 above but refers to TSF data instead of User Data. Therefore, it should be understood as to refer to the same Data Processing Policy defined under FDP_IFC.1 below.

Subset information flow control (FDP_IFC.1)

157 The TSF shall enforce the ***Data Processing Policy*** on ***all confidential data when they are processed or transferred by the TOE or by the Security IC Embedded Software***.

158 *SFP_2: Data Processing Policy*

User Data of the Composite TOE and TSF data shall not be accessible from the TOE except when the Security IC Embedded Software decides to communicate the User Data via an external interface. The protection shall be applied to confidential data only but without the distinction of attributes controlled by the Security IC Embedded Software.

Random number generation (FCS_RNG.1)

159 The TSF shall provide a ***physical*** random number generator that implements:

- ***(PTG.2.1) A total failure test detects a total failure of entropy source immediately when the RNG has started. When a total failure is detected, no random numbers will be output.***
- ***(PTG.2.2) If a total failure of the entropy source occurs while the RNG is being operated, the RNG prevents the output of any internal random number that depends on some raw random numbers that have been generated after the total failure of the entropy source.***
- ***(PTG.2.3) The online test shall detect non-tolerable statistical defects of the raw random number sequence (i) immediately when the RNG has started, and (ii) while the RNG is being operated. The TSF must not output any random numbers before the power-up online test has finished successfully or when a defect has been detected.***
- ***(PTG.2.4) The online test procedure shall be effective to detect non-tolerable weaknesses of the random numbers soon.***
- ***(PTG.2.5) The online test procedure checks the quality of the raw random number sequence. It is triggered externally. The online test is suitable for detecting non-tolerable statistical defects of the statistical properties of the raw random numbers within an acceptable period of time.***

160 The TSF shall provide ***octets of bits*** that meet

- ***(PTG.2.6) Test procedure A does not distinguish the internal random numbers from output sequences of an ideal RNG.***
- ***(PTG.2.7) The average Shannon entropy per internal random bit exceeds 0.997.***

6.1.2 Additional Security Functional Requirements for the cryptographic services

Cryptographic operation (FCS_COP.1)

161 The TSF shall perform ***the operations in*** Table 9 in accordance with a specified cryptographic algorithm ***in*** Table 9 and cryptographic key sizes ***of*** Table 9 that meet the ***standards in*** Table 9***.***

Table 9. FCS_COP.1 iterations (cryptographic operations)

Iteration label	[assignment: list of cryptographic operations]	[assignment: cryptographic algorithm]	[assignment: cryptographic key sizes]	[assignment: list of standards]
TDES(1)	* encryption * decryption - in Cipher Block Chaining (CBC) mode - in Electronic Code Book (ECB) mode	Triple Data Encryption Standard	112 and 168 bits	*NIST SP 800-67* *NIST SP 800-38A*
AES	* encryption (cipher) * decryption (inverse cipher) - in Cipher Block Chaining (CBC) mode - in Electronic Code Book (ECB) mode	Advanced Encryption Standard	128, 192 and 256 bits	*FIPS PUB 197*

1. Single DES and triple DES with two keys are no longer recommended as encryption functions. Triple DES with three keys can be used until end 2027 as recommended in *ECCG-ACM*. However depending on the context of use, the Embedded Software might need to use triple DES with two keys, in that case it is submitted to a dedicated cryptographic analysis evaluation that will take consideration of the composite product specific context of use.

6.1.3 Additional Security Functional Requirements for the memories protection

162 The following SFRs are extensions to "*BSI-CC-PP-0084-2014*" Protection Profile (PP), related to the memories protection.

Static attribute initialisation (FMT_MSA.3) / Memories

163 The TSF shall enforce the ***Memory Access Control Policy*** to provide ***minimally protective***(a) default values for security attributes that are used to enforce the SFP.

164 The TSF shall allow ***none*** to specify alternative initial values to override the default values when an object or information is created.

Management of security attributes (FMT_MSA.1) / Memories

165 The TSF shall enforce the ***Memory Access Control Policy*** to restrict the ability to ***modify*** the security attributes:

- ***Location of the Protected Application code and data*** to ***Nobody,***
- ***Location of the Protected Sectors*** to ***Anybody***.

Subset access control (FDP_ACC.1) / Memories

166 The TSF shall enforce the ***Memory Access Control Policy*** on ***the Protected Application code and data, Protected sectors.***

a. See the Datasheet referenced in *Section 8* for actual values.

Security attribute based access control (FDP_ACF.1) / Memories

167 The TSF shall enforce the ***Memory Access Control Policy*** to objects based on the following: ***Protected Application code and data, Protected sectors***.

168 The TSF shall enforce the following rules to determine if an operation among controlled subjects and controlled objects is allowed: ***An application cannot read, write, compare any piece of data or code belonging to the Protected Application, a Protected sector cannot be programmed or erased.***

169 The TSF shall explicitly authorise access of subjects to objects based on the following additional rules: ***None***.

170 The TSF shall explicitly deny access of subjects to objects based on the following additional rules:

- ***in User configuration, any access (read, write, execute) to the OST ROM is denied,***
- ***in User configuration, any write access to the ST NVM is denied.***

171 The following SFP ***Memory Access Control Policy*** is defined for the requirement "Security attribute based access control (FDP_ACF.1) / Memories":

172 *SFP_3: Memory Access Control Policy*

173 *Another application cannot read, write, compare any piece of data or code belonging to the Protected Application. A Protected sector cannot be programmed or erased.*

Application Note:
One only application can be protected by the LPU.

174 The TSF shall explicitly deny access of subjects to objects based on the following additional rules:

- ***in User configuration, any access (read, write, execute) to the OST ROM is denied,***
- ***in User configuration, any write access to the ST NVM is denied.***

Specification of management functions (FMT_SMF.1) / Memories

175 The TSF will be able to perform the following management functions: ***define the protected sectors.***

6.1.4 Additional Security Functional Requirements related to the loading and authentication capabilities

Authentication Proof of Identity (FIA_API.1)

176 The TSF shall provide a ***command based on a cryptographic mechanism*** to prove the identity of the ***TOE*** by including the following property: ***CMAC AES-128 based*** signature to an external entity.

Limited capabilities (FMT_LIM.1) / Loader

177 The TSF shall limits its capabilities so that in conjunction with “Limited availability (FMT_LIM.2)” the following policy is enforced: ***Loader Limited capability Policy.***

178 *SFP_4: Loader Limited capability Policy*

179 *Deploying Loader functionality after **delivery** does not allow stored user data to be disclosed or manipulated by unauthorized user.*

Limited availability (FMT_LIM.2) / Loader

180 The TSF shall be designed in a manner that limits its availability so that in conjunction with "Limited capabilities (FMT_LIM.1)" the following policy is enforced: ***Loader Limited availability Policy***.

181 *SFP_5: Loader Limited availability Policy*

182 *The TSF prevents deploying the Loader functionality after **blocking of the loader**.*

183 **Note**: Blocking the loader is just an option.

Inter-TSF trusted channel (FTP_ITC.1) / Loader

184 The TSF shall provide a communication channel between itself and another trusted IT product that is logically distinct from other communication channels and provides assured identification of its end points and protection of the channel data from modification or disclosure.

185 The TSF shall permit another trusted IT product to initiate communication via the trusted channel.

186 The TSF shall initiate communication via the trusted channel for ***Maintenance transaction***.

187 ***Refinement:***

In practice, the communication is not initiated by the TSF.

Basic data exchange confidentiality (FDP_UCT.1) / Loader

188 The TSF shall enforce the *Loader SFP* to receive user data in a manner protected from unauthorized disclosure.

Data exchange integrity (FDP_UIT.1) / Loader

189 The TSF shall enforce the *Loader SFP* to receive user data in a manner protected from modification, deletion, insertion errors.

190 The TSF shall be able to determine on receipt of user data, whether modification, deletion, insertion has occurred.

Subset access control (FDP_ACC.1) / Loader

191 The TSF shall enforce the *Loader SFP* on:

- the subjects ***ST Loader, User Loader, and Delegated Loader,***
- the objects user data in ***User NVM and ST data in ST NVM,***
- the operation ***Maintenance transaction***.

Security attribute based access control (FDP_ACF.1) / Loader

192 The TSF shall enforce the *Loader SFP* to objects based on the following: ***all subjects, objects and attributes defined in the Loader SFP.***

193 The TSF shall enforce the following rules to determine if an operation among controlled subjects and controlled objects is allowed: ***if the user authenticated role is allowed to***

perform the maintenance transaction and the maintenance transaction is legitimate and the loaded data emanates from an authorized originator.

Note that the term “data” also addresses Additional Code, as this code is seen as data by the TSF.

194 The TSF shall explicitly authorize access of subjects to objects based on the following additional rules: ***none.***

195 The TSF shall explicitly deny access of subjects to objects based on the following additional rules: ***none.***

196 The following SFP ***Loader SFP*** is defined for the requirements “Basic data exchange confidentiality (FDP_UCT.1) / Loader”, “Data exchange integrity (FDP_UIT.1) / Loader”, “Subset access control (FDP_ACC.1) / Loader”, "Security attribute based access control (FDP_ACF.1) / Loader", "Static attribute initialisation (FMT_MSA.3) / Loader", and "Management of security attributes (FMT_MSA.1) / Loader":

197 SFP_6: Loader SFP

*198 The TSF must enforce that a maintenance transaction is performed if and only if **the user authenticated role is allowed to perform the maintenance transaction and the maintenance transaction is legitimate and the loaded data emanates from an authorized originator.***

The TSF ruling is done according to a fixed access rights matrix, based on the subject, object and security attributes listed below.

The Security Function Policy (SFP) Loader SFP uses the following definitions:

- *the subjects are the ST Loader, the User Loader, and the Delegated Loader,*
- *the objects are ST NVM and User NVM,*
- *the operation is Maintenance transaction,*
- *the security attributes linked to the subjects are the remaining sessions, the number of consecutive authentication failures, the allowed memory areas, the logging capacity, the transaction identification.*

Note that subjects are authorized by cryptographic keys. These keys are considered as authentication data and not as security attributes.

Failure with preservation of secure state (FPT_FLS.1) / Loader

199 The TSF shall preserve a secure state when the following types of failures occur: ***the maintenance transaction is incomplete***.

Static attribute initialisation (FMT_MSA.3) / Loader

200 The TSF shall enforce the ***Loader SFP*** to provide ***restrictive*** default values for security attributes that are used to enforce the SFP.

201 The TSF shall allow ***none*** to specify alternative initial values to override the default values when an object or information is created.

Management of security attributes (FMT_MSA.1) / Loader

202 The TSF shall enforce the ***Loader SFP*** to restrict the ability to ***modify*** the security attributes ***remaining sessions, transaction identification*** to ***the ST Loader or User Loader.***

Specification of management functions (FMT_SMF.1) / Loader

203 The TSF will be able to perform the following management functions: ***change the role authentication data, change the remaining sessions, block a role, under the Loader SFP.***

Security roles (FMT_SMR.1) / Loader

204 The TSF shall maintain the roles: ***ST Loader, User Loader, Delegated Loader, Secure Diagnostic, and Everybody***.

205 The TSF shall be able to associate users with roles.

Timing of identification (FIA_UID.1) / Loader

206 The TSF shall allow ***boot, authentication command and non-critical queries*** on behalf of the user to be performed before the user is identified.

207 The TSF shall require each user to be successfully identified before allowing any other TSF mediated actions on behalf of that user.

Timing of authentication (FIA_UAU.1) / Loader

208 The TSF shall allow ***boot, authentication command and non-critical queries*** on behalf of the user to be performed before the user is authenticated.

209 The TSF shall require each user to be successfully authenticated before allowing any other TSF mediated actions on behalf of that user.

Audit storage (FAU_SAS.1) / Loader

210 The TSF shall provide ***the Loader*** with the capability to store the ***transaction identification of the loaded data*** in the ***NVM***.

211 ***Refinement:***

The TSF shall systematically store the transaction identification provided by the ST Loader or User Loader together with the loaded data.

Audit review (FAU_SAR.1) / Loader

212 The TSF shall provide ***Everybody*** with the capability to read the ***Product information and the Identification of the last completed maintenance transaction, if any,*** from the audit records.

213 The TSF shall provide the audit records in a manner suitable for the user to interpret the information.

6.1.5 Additional Security Functional Requirements related to the Secure Diagnostic capabilities

Limited capabilities (FMT_LIM.1) / Sdiag

214 The TSF shall limit its capabilities so that in conjunction with “Limited availability (FMT_LIM.2)” the following policy is enforced: ***Sdiag Limited Capability Policy.***

215 *SFP_7: Sdiag Limited Capability Policy*

216 *Deploying Secure Diagnostic capability does not allow stored user data of the Composite TOE to be disclosed or manipulated, TSF data to be disclosed or manipulated, software to be reconstructed and no substantial information about construction of TSF to be gathered which may enable other attacks.*

Limited availability (FMT_LIM.2) / Sdiag

217 The TSF shall be designed in a manner that limits its availability so that in conjunction with "Limited capabilities (FMT_LIM.1)" the following policy is enforced: ***Sdiag Limited Availability Policy***.

218 *SFP_8: Sdiag Limited Availability Policy*

219 *The TSF prevents deploying the Secure Diagnostic capability unless the Secure Diagnostic mode is explicitly enabled by the authorized user. When the Secure Diagnostic capability is deployed, the TSF allows performing only authorized and authentic diagnostic transactions.*

220 ***Refinement:***

By enabling the Secure Diagnostic capability, the Composite Product Manufacturer gives authority to the IC manufacturer to exercise the Secure Diagnostic capability known to abide by SFP_7.

Inter-TSF trusted channel (FTP_ITC.1) / Sdiag

221 The TSF shall provide a communication channel between itself and another trusted IT product that is logically distinct from other communication channels and provides assured identification of its end points and protection of the channel data from modification or disclosure.

222 The TSF shall permit another trusted IT product to initiate communication via the trusted channel.

223 The TSF shall initiate communication via the trusted channel for ***Secure Diagnostic transaction***.

224 ***Refinement:***

In practice, the communication is initiated by the trusted IT product.

Audit review (FAU_SAR.1) / Sdiag

225 The TSF shall provide ***Everybody*** with the capability to read the ***Secure Diagnostic enable status,*** from the audit records.

226 The TSF shall provide the audit records in a manner suitable for the user to interpret the information.

6.2 TOE security assurance requirements

227 Security Assurance Requirements for the TOE for the evaluation of the TOE are those taken from the Evaluation Assurance Level ***5*** (EAL***5***) and augmented by taking the following components:

- ***ASE_TSS.2, ALC_FLR.2***, ALC_DVS.2 and AVA_VAN.5.

228 Regarding application note 22 of *BSI-CC-PP-0084-2014*, the continuously increasing maturity level of evaluations of Security ICs justifies the selection of a higher-level assurance package.

229 The component ASE_TSS.2 is chosen as an augmentation in this ST to give architectural information on the security functionality of the TOE.

230 The component ALC_FLR.2 is chosen as an augmentation in this ST because a solid flaw management is key for the continuous improvement of the security IC platforms, especially on markets which need highly resistant and long lasting products.

231 The set of security assurance requirements (SARs) is presented in *Table 10*, indicating the origin of the requirement.

Table 10. TOE security assurance requirements

Label	Title	Origin
ADV_ARC.1	Security architecture description	EAL5/*BSI-CC-PP-0084-2014*
ADV_FSP.5	Complete semi-formal functional specification with additional error information	EAL5
ADV_IMP.1	Implementation representation of the TSF	EAL5/*BSI-CC-PP-0084-2014*
ADV_INT.2	Well-structured internals	EAL5
ADV_TDS.4	Semiformal modular design	EAL5
AGD_OPE.1	Operational user guidance	EAL5/*BSI-CC-PP-0084-2014*
AGD_PRE.1	Preparative procedures	EAL5/*BSI-CC-PP-0084-2014*
ALC_CMC.4	Production support, acceptance procedures and automation	EAL5/*BSI-CC-PP-0084-2014*
ALC_CMS.5	Development tools CM coverage	EAL5
ALC_DEL.1	Delivery procedures	EAL5/*BSI-CC-PP-0084-2014*
ALC_DVS.2	Sufficiency of security measures	*BSI-CC-PP-0084-2014*
ALC_FLR.2	Flaw reporting procedures	Security Target
ALC_LCD.1	Developer defined life-cycle model	EAL5/*BSI-CC-PP-0084-2014*
ALC_TAT.2	Compliance with implementation standards	EAL5
ASE_CCL.1	Conformance claims	EAL5/*BSI-CC-PP-0084-2014*
ASE_ECD.1	Extended components definition	EAL5/*BSI-CC-PP-0084-2014*
ASE_INT.1	ST introduction	EAL5/*BSI-CC-PP-0084-2014*
ASE_OBJ.2	Security objectives	EAL5/*BSI-CC-PP-0084-2014*
ASE_REQ.2	Derived security requirements	EAL5/*BSI-CC-PP-0084-2014*
ASE_SPD.1	Security problem definition	EAL5/*BSI-CC-PP-0084-2014*
ASE_TSS.2	TOE summary specification with architectural design summary	Security Target
ATE_COV.2	Analysis of coverage	EAL5/*BSI-CC-PP-0084-2014*
ATE_DPT.3	Testing: modular design	EAL5
ATE_FUN.1	Functional testing	EAL5/*BSI-CC-PP-0084-2014*

Table 10. TOE security assurance requirements (continued)

Label	Title	Origin
ATE_IND.2	Independent testing - sample	EAL5/*BSI-CC-PP-0084-2014*
AVA_VAN.5	Advanced methodical vulnerability analysis	*BSI-CC-PP-0084-2014*

6.3 Refinement of the security assurance requirements

232 As *BSI-CC-PP-0084-2014* defines refinements for selected SARs, these refinements are also claimed in this Security Target.

233 The main customizing is that the IC Dedicated Software is an operational part of the TOE after delivery, although it is mainly not available to the user.

234 Regarding application note 23 of *BSI-CC-PP-0084-2014*, the refinements for all the assurance families have been reviewed for the hierarchically higher-level assurance components selected in this Security Target.

235 The text of the impacted refinements of *BSI-CC-PP-0084-2014* is reproduced in the next sections.

236 For reader's ease, an impact summary is provided in *Table 11*.

Table 11. Impact of EAL5 selection on *BSI-CC-PP-0084-2014* refinements

Assurance Family	*BSI-CC-PP-0084-2014* Level	ST Level	Impact on refinement
ALC_DEL	1	1	None
ALC_DVS	2	2	None
ALC_CMS	4	5	None, refinement is still valid
ALC_CMC	4	4	None
ADV_ARC	1	1	None
ADV_FSP	4	5	Presentation style changes, IC Dedicated Software is included
ADV_IMP	1	1	None
ATE_COV	2	2	IC Dedicated Software is included
AGD_OPE	1	1	None
AGD_PRE	1	1	None
AVA_VAN	5	5	None

6.3.1 Refinement regarding functional specification (ADV_FSP)

237 ~~Although the IC Dedicated Test Software is a part of the TOE, the test functions of the IC Dedicated Test Software are not described in the Functional Specification because the IC Dedicated Test Software is considered as a test tool delivered with the TOE but not providing security functions for the operational phase of the TOE.~~ ***The IC Dedicated***

Software provides security functionalities as soon as the TOE becomes operational (boot software). These are properly identified in the delivered documentation.

238 The Functional Specification ***refers to datasheet to*** trace security features that do not provide any external interface but that contribute to fulfil the SFRs e.g. like physical protection. Thereby they are part of the complete instantiation of the SFRs.

239 The Functional Specification ***refers to design specifications to detail the*** mechanisms against physical attacks ***described*** in a more general way only, but detailed enough to be able to support Test Coverage Analysis also for those mechanisms where inspection of the layout is of relevance or tests beside the TSFI may be needed.

240 The Functional Specification ***refers to datasheet to*** specify operating conditions of the TOE. These conditions include but are not limited to the frequency of the clock, the power supply, and the temperature.

241 All functions and mechanisms which control access to the functions provided by the IC Dedicated Test Software (refer to the security functional requirement (FMT_LIM.2)) ***are part of the*** Functional Specification. Details will be given in the document for ADV_ARC~~, refer to Section 6.2.1.5.~~ In addition, all these functions and mechanisms ***are*** subsequently ~~be~~ refined according to all relevant requirements of the Common Criteria assurance class ADV because these functions and mechanisms are active after TOE Delivery and need to be part of the assurance aspects Tests (class ATE) and Vulnerability Assessment (class AVA). Therefore, all necessary information ***is*** provided to allow tests and vulnerability assessment.

242 Since the selected higher-level assurance component requires a security functional specification presented in a “semi-formal style" (ADV_FSP.5.2C) the changes affect the style of description, the *BSI-CC-PP-0084-2014* refinements can be applied with changes covering the IC Dedicated Test Software and are valid for ADV_FSP.5.

6.3.2 Refinement regarding test coverage (ATE_COV)

243 The TOE ***is*** tested under different operating conditions within the specified ranges. These conditions include but are not limited to the frequency of the clock, the power supply, and the temperature. This means that “Fault tolerance (FRU_FLT.2)” ***is*** proven for the complete TSF. The tests ~~must~~ also cover functions which may be affected by “ageing” (such as ~~EEPROM~~ ***NVM*** writing).

244 The existence and effectiveness of measures against physical attacks (as specified by the functional requirement FPT_PHP.3) cannot be tested in a straightforward way. Instead ***STMicroelectronics provides*** evidence that the TOE actually has the particular physical characteristics (especially layout design principles). This ***is*** done by checking the layout (implementation or actual) in an appropriate way. The required evidence pertains to the existence of mechanisms against physical attacks (unless being obvious).

245 ~~The IC Dedicated Test Software is seen as a “test tool” being delivered as part of the TOE. However, the Test Features do not provide security functionality. Therefore, Test Features need not to be covered by the Test Coverage Analysis but all functions and mechanisms which limit the capability of the functions (cf. FMT_LIM.1) and control access to the functions (cf. FMT_LIM.2) provided by the IC Dedicated Test Software must be part of the Test Coverage Analysis.~~ ***The IC Dedicated Software provides security functionalities as soon as the TOE becomes operational (boot software). These are part of the Test Coverage Analysis.***

6.4 Security Requirements rationale

6.4.1 Rationale for the Security Functional Requirements

246 Just as for the security objectives rationale of *Section 4.3*, the main line of this rationale is that the inclusion of all the security requirements of the *BSI-CC-PP-0084-2014* Protection Profile, together with those in *AUG*, and with those introduced in this Security Target, guarantees that all the security objectives identified in *Section 4* are suitably addressed by the security requirements stated in this chapter, and that the latter together form an internally consistent whole.

Table 12. Security Requirements versus Security Objectives

Security Objective	TOE Security Functional and Assurance Requirements
BSI.O.Leak-Inherent	*Basic internal transfer protection FDP_ITT.1* *Basic internal TSF data transfer protection FPT_ITT.1* *Subset information flow control FDP_IFC.1*
BSI.O.Phys-Probing	*Stored data confidentiality FDP_SDC.1* *Resistance to physical attack FPT_PHP.3*
BSI.O.Malfunction	*Limited fault tolerance FRU_FLT.2* *Failure with preservation of secure state FPT_FLS.1*
BSI.O.Phys-Manipulation	*Stored data integrity monitoring and action FDP_SDI.2* *Resistance to physical attack FPT_PHP.3*
BSI.O.Leak-Forced	All requirements listed for *BSI.O.Leak-Inherent* *FDP_ITT.1*, *FPT_ITT.1*, *FDP_IFC.1* plus those listed for *BSI.O.Malfunction* and *BSI.O.Phys-Manipulation* *FRU_FLT.2*, *FPT_FLS.1*, *FDP_SDI.2*, *FPT_PHP.3*
BSI.O.Abuse-Func	*Limited capabilities FMT_LIM.1 / Test* *Limited availability FMT_LIM.2 / Test* *Limited capabilities - Secure Diagnostic FMT_LIM.1 / Sdiag* *Limited availability - Secure Diagnostic FMT_LIM.2 / Sdiag* *Inter-TSF trusted channel - Secure Diagnostic FTP_ITC.1 / Sdiag* *Audit review - Secure Diagnostic FAU_SAR.1 / Sdiag* plus those for *BSI.O.Leak-Inherent, BSI.O.Phys-Probing, BSI.O.Malfunction, BSI.O.Phys-Manipulation, BSI.O.Leak-Forced* *FDP_ITT.1*, *FPT_ITT.1*, *FDP_IFC.1*, *FDP_SDC.1*, *FDP_SDI.2*, *FPT_PHP.3*, *FRU_FLT.2*, *FPT_FLS.1*
BSI.O.Identification	*Audit storage FAU_SAS.1*
BSI.O.RND	*Random number generation FCS_RNG.1* plus those for *BSI.O.Leak-Inherent, BSI.O.Phys-Probing, BSI.O.Malfunction, BSI.O.Phys-Manipulation, BSI.O.Leak-Forced* *FDP_ITT.1*, *FPT_ITT.1*, *FDP_IFC.1*, *FDP_SDI.2*, *FDP_SDC.1*, *FPT_PHP.3*, *FRU_FLT.2*, *FPT_FLS.1*
BSI.OE.Resp-Appl	Not applicable

Table 12. Security Requirements versus Security Objectives

Security Objective	TOE Security Functional and Assurance Requirements
BSI.OE.Process-Sec-IC	Not applicable
BSI.OE.Lim-Block-Loader	Not applicable
BSI.OE.Loader-Usage	Not applicable
BSI.OE.TOE-Auth	Not applicable
OE.Enable-Disable-Secure-Diag	Not applicable
OE.Secure-Diag-Usage	Not applicable
BSI.O.Authentication	*Authentication Proof of Identity FIA_API.1*
BSI.O.Cap-Avail-Loader	*Limited capabilities FMT_LIM.1 / Loader* *Limited availability FMT_LIM.2 / Loader*
BSI.O.Ctrl-Auth-Loader	“*Inter-TSF trusted channel - Loader*” *FTP_ITC.1 / Loader* “*Basic data exchange confidentiality - Loader*” *FDP_UCT.1 / Loader* “*Data exchange integrity - Loader*” *FDP_UIT.1 / Loader* “*Subset access control - Loader*” *FDP_ACC.1 / Loader* “*Security attribute based access control - Loader*” *FDP_ACF.1 / Loader* “*Static attribute initialisation - Loader*” *FMT_MSA.3 / Loader* “*Management of security attribute - Loader*” *FMT_MSA.1 / Loader* “*Specification of management functions - Loader*” *FMT_SMF.1 / Loader* “*Security roles - Loader*” *FMT_SMR.1 / Loader* “*Timing of identification - Loader*” *FIA_UID.1 / Loader* “*Timing of authentication - Loader*” *FIA_UAU.1 / Loader*
JIL.O.Prot-TSF-Confidentiality	“*Inter-TSF trusted channel - Loader*” *FTP_ITC.1 / Loader* “*Basic data exchange confidentiality - Loader*” *FDP_UCT.1 / Loader* “*Data exchange integrity - Loader*” *FDP_UIT.1 / Loader* “*Subset access control - Loader*” *FDP_ACC.1 / Loader* “*Security attribute based access control - Loader*” *FDP_ACF.1 / Loader* “*Static attribute initialisation - Loader*” *FMT_MSA.3 / Loader* “*Management of security attribute - Loader*” *FMT_MSA.1 / Loader* “*Specification of management functions - Loader*” *FMT_SMF.1 / Loader* “*Security roles - Loader*” *FMT_SMR.1 / Loader* “*Timing of identification - Loader*” *FIA_UID.1 / Loader* “*Timing of authentication - Loader*” *FIA_UAU.1 / Loader*

Table 12. Security Requirements versus Security Objectives

Security Objective	TOE Security Functional and Assurance Requirements
JIL.O.Secure-Load-ACode	"*Inter-TSF trusted channel - Loader*" *FTP_ITC.1 / Loader* "*Basic data exchange confidentiality - Loader*" *FDP_UCT.1 / Loader* "*Data exchange integrity - Loader*" *FDP_UIT.1 / Loader* "*Subset access control - Loader*" *FDP_ACC.1 / Loader* "*Security attribute based access control - Loader*" *FDP_ACF.1 / Loader* "*Static attribute initialisation - Loader*" *FMT_MSA.3 / Loader* "*Management of security attribute - Loader*" *FMT_MSA.1 / Loader* "*Specification of management functions - Loader*" *FMT_SMF.1 / Loader* "*Security roles - Loader*" *FMT_SMR.1 / Loader* "*Timing of identification - Loader*" *FIA_UID.1 / Loader* "*Timing of authentication - Loader*" *FIA_UAU.1 / Loader* "*Audit storage - Loader*" *FAU_SAS.1 / Loader*
JIL.O.Secure-AC-Activation	"*Failure with preservation of secure state - Loader*" *FPT_FLS.1 / Loader*
JIL.O.TOE-Identification	"*Audit storage - Loader*" *FAU_SAS.1 / Loader* "*Audit review - Loader*" *FAU_SAR.1 / Loader* "*Stored data integrity monitoring and action*" *FDP_SDI.2*
O.Secure-Load-AMemImage	"*Inter-TSF trusted channel - Loader*" *FTP_ITC.1 / Loader* "*Basic data exchange confidentiality - Loader*" *FDP_UCT.1 / Loader* "*Data exchange integrity - Loader*" *FDP_UIT.1 / Loader* "*Subset access control - Loader*" *FDP_ACC.1 / Loader* "*Security attribute based access control - Loader*" *FDP_ACF.1 / Loader* "*Static attribute initialisation - Loader*" *FMT_MSA.3 / Loader* "*Management of security attribute - Loader*" *FMT_MSA.1 / Loader* "*Specification of management functions - Loader*" *FMT_SMF.1 / Loader* "*Security roles - Loader*" *FMT_SMR.1 / Loader* "*Timing of identification - Loader*" *FIA_UID.1 / Loader* "*Timing of authentication - Loader*" *FIA_UAU.1 / Loader* "*Audit storage - Loader*" *FAU_SAS.1 / Loader*
O.MemImage-Identification	"*Failure with preservation of secure state - Loader*" *FPT_FLS.1 / Loader* "*Audit storage - Loader*" *FAU_SAS.1 / Loader* "*Audit review - Loader*" *FAU_SAR.1 / Loader* "*Stored data integrity monitoring and action*" *FDP_SDI.2*
OE.Composite-TOE-Id	Not applicable
OE.TOE-Id	Not applicable

Table 12. Security Requirements versus Security Objectives

Security Objective	TOE Security Functional and Assurance Requirements
AUG1.O.Add-Functions	*Cryptographic operation FCS_COP.1*
AUG4.O.Mem-Access	*Subset access control FDP_ACC.1 / Memories* *Security attribute based access control FDP_ACF.1 / Memories* *Static attribute initialisation FMT_MSA.3 / Memories* *Management of security attribute FMT_MSA.1 / Memories* *Specification of management functions FMT_SMF.1 / Memories*

247 As origins of security objectives have been carefully kept in their labelling, and origins of security requirements have been carefully identified in *Table 8* and *Table 12*, it can be verified that the justifications provided by the *BSI-CC-PP-0084-2014* Protection Profile and *AUG* can just be carried forward to their union.

248 From *Table 6*, it is straightforward to identify additional security objectives for the TOE (*AUG1.O.Add-Functions* and *AUG4.O.Mem-Access*) tracing back to *AUG*, additional objectives (*JIL.O.Prot-TSF-Confidentiality*, *JIL.O.Secure-Load-ACode*, *JIL.O.Secure-AC-Activation* and *JIL.O.TOE-Identification*) tracing back to *JIL-CC-SRFPDCL* / *ANSSI-CC-CER/F/06.002*, and additional objectives (*O.Secure-Load-AMemImage*, and *O.MemImage-Identification*) introduced in this Security Target. This rationale must show that security requirements suitably address them all.

249 Furthermore, a careful observation of the requirements listed in *Table 8* and *Table 12* shows that:

- there are security requirements introduced from *AUG* (*FCS_COP.1*, *FDP_ACC.1 / Memories*, *FDP_ACF.1 / Memories*, *FMT_MSA.3 / Memories* and *FMT_MSA.1 / Memories*),
- there are additional security requirements introduced by this Security Target (*FMT_MSA.3 / Loader*, *FMT_MSA.1 / Loader*, *FMT_SMF.1 / Loader*, *FMT_SMR.1 / Loader*, *FIA_UID.1 / Loader*, *FIA_UAU.1 / Loader*, *FPT_FLS.1 / Loader*, *FAU_SAS.1 / Loader*, *FAU_SAR.1 / Loader*, *FMT_SMF.1 / Memories*, *FTP_ITC.1 / Sdiag*, *FAU_SAR.1 / Sdiag*, *FMT_LIM.1 / Sdiag*, *FMT_LIM.2 / Sdiag*, and various assurance requirements of EAL5+).

250 Though it remains to show that:

- security objectives from this Security Target, from *JIL-CC-SRFPDCL* / *ANSSI-CC-CER/F/06.002* and from *AUG* are addressed by security requirements stated in this chapter,
- additional security requirements from this Security Target and from *AUG* are mutually supportive with the security requirements from the *BSI-CC-PP-0084-2014* Protection Profile, and they do not introduce internal contradictions,
- all dependencies are still satisfied.

251 The justification that the additional security objectives are suitably addressed, that the additional security requirements are mutually supportive and that, together with those already in *BSI-CC-PP-0084-2014*, they form an internally consistent whole, is provided in the next subsections.

6.4.2 Additional security objectives are suitably addressed

Security objective “Area based Memory Access Control (*AUG4.O.Mem-Access*)”

252 The justification related to the security objective “Area based Memory Access Control (*AUG4.O.Mem-Access*)” is as follows:

253 The security functional requirements "*Subset access control (FDP_ACC.1) / Memories*" ***and*** ***"****Security attribute based access control (FDP_ACF.1) / Memories****"***, with the related Security Function Policy (SFP) “***Memory Access Control Policy***” exactly require to implement an area based memory access control as demanded by *AUG4.O.Mem-Access*. Therefore, *FDP_ACC.1 / Memories* ***and*** *FDP_ACF.1 / Memories* with ***their*** SFP ***are*** suitable to meet the security objective.

254 The security functional requirement "*Static attribute initialisation (FMT_MSA.3) / Memories*" requires that the TOE provides default values for security attributes. The ability to update the security attributes is restricted to privileged subject(s) ***as further detailed in the security functional requirement "****Management of security attributes (FMT_MSA.1) / Memories****"***. These management functions ensure that the required access control can be realised using the functions provided by the TOE.

Security objective “Additional Specific Security Functionality (*AUG1.O.Add-Functions*)”

255 The justification related to the security objective “Additional Specific Security Functionality (*AUG1.O.Add-Functions*)” is as follows:

256 The security functional requirements “*Cryptographic operation (FCS_COP.1)*” exactly requires those functions to be implemented that are demanded by *AUG1.O.Add-Functions****.*** Therefore, *FCS_COP.1* is suitable to meet the security objective.

Security objective “Protection against Abuse of Functionality (*BSI.O.Abuse-Func*)”

257 This objective states that abuse of functions (especially provided by the IC Dedicated Test Software, for instance in order to read secret data) must not be possible in Phase 7 of the life-cycle. There are two possibilities to achieve this: (i) They cannot be used by an attacker (i. e. its availability is limited) or (ii) using them would not be of relevant use for an attacker (i. e. its capabilities are limited) since the functions are designed in a specific way. The first possibility is specified by "*Limited availability (FMT_LIM.2) / Test*" ***and*** "*Limited availability (FMT_LIM.2) / Sdiag*", and the second one by "*Limited capabilities (FMT_LIM.1) / Test*" ***and*** "*Limited capabilities (FMT_LIM.1) / Sdiag*". Since these requirements are combined to support the policy, which is suitable to fulfil O.Abuse-Func, ***these*** security functional requirements together are suitable to meet the objective.

258 Other security functional requirements which prevent attackers from circumventing the functions implementing these two security functional requirements (for instance by manipulating the hardware) also support the objective. The relevant ***Security Functional requirements*** are also listed in *Table 12*.

Security objective “Access control and authenticity for the Loader (*BSI.O.Ctrl-Auth-Loader*)”

259 The justification related to the security objective “Access control and authenticity for the Loader (*BSI.O.Ctrl-Auth-Loader*)” is as follows:

260 The ***security functional requirement*** "*Subset access control (FDP_ACC.1) / Loader*" defines the subjects, objects and operations of the Loader SFP enforced by the SFR *FTP_ITC.1 / Loader*, *FDP_UCT.1 / Loader*, *FDP_UIT.1 / Loader* and *FDP_ACF.1 / Loader*.
The ***security functional requirement*** "*Inter-TSF trusted channel (FTP_ITC.1) / Loader*" requires the TSF to establish a trusted channel with assured identification of its end points and protection of the channel data from modification or disclosure.
The ***security functional requirement*** "*Basic data exchange confidentiality (FDP_UCT.1) / Loader*" requires the TSF to receive data protected from unauthorized disclosure.
The ***security functional requirement*** "*Data exchange integrity (FDP_UIT.1) / Loader*" requires the TSF to verify the integrity ***and the rightfulness*** of the received data.
The ***security functional requirement*** "*Security attribute based access control (FDP_ACF.1) / Loader*" requires the TSF to implement access control for the Loader functionality.
Therefore, *FTP_ITC.1 / Loader*, *FDP_UCT.1 / Loader*, *FDP_UIT.1 / Loader*, *FDP_ACC.1 / Loader* and *FDP_ACF.1 / Loader* with their SFP are suitable to meet the security objective.

261 Complementary, the security functional requirement "*Static attribute initialisation (FMT_MSA.3) / Loader*" requires that the TOE provides default values for security attributes. The ability to update the security attributes is restricted to privileged subject(s) as further detailed in the security functional requirement "*Management of security attributes (FMT_MSA.1) / Loader*"
The security functional requirements "*Security roles (FMT_SMR.1) / Loader*", "*Timing of identification (FIA_UID.1) / Loader*" and "*Timing of authentication (FIA_UAU.1) / Loader*" specify the roles that the TSF recognises and the actions authorized before their identification.
The security functional requirement "*Specification of management functions (FMT_SMF.1) / Loader*" provides additional controlled facility for adapting the loader behaviour to the user's needs. These management functions ensure that the required access control, associated to the loading feature, can be realized using the functions provided by the TOE.

Security objectives "Protection of the confidentiality of the TSF (*JIL.O.Prot-TSF-Confidentiality*)", "Secure loading of the Additional Code (*JIL.O.Secure-Load-ACode*)" and "Secure loading of the Additional Memory Image (*O.Secure-Load-AMemImage*)"

262 The justification related to the security objectives "Protection of the confidentiality of the TSF (*JIL.O.Prot-TSF-Confidentiality*)", "Secure loading of the Additional Code (*JIL.O.Secure-Load-ACode*)" and "Secure loading of the Additional Memory Image (*O.Secure-Load-AMemImage*)" is as follows:

263 The security functional requirement "*Subset access control (FDP_ACC.1) / Loader*" defines the subjects, objects and operations of the Loader SFP enforced by the SFR FTP_ITC.1, FDP_UCT.1, FDP_UIT.1 and FDP_ACF.1/Loader.
The security functional requirement "*Inter-TSF trusted channel (FTP_ITC.1) / Loader*" requires the TSF to establish a trusted channel with assured identification of its end points and protection of the channel data from modification or disclosure.
The security functional requirement "*Basic data exchange confidentiality (FDP_UCT.1) / Loader*" requires the TSF to receive data protected from unauthorized disclosure.
The security functional requirement "*Data exchange integrity (FDP_UIT.1) / Loader*" requires the TSF to verify the integrity of the received data.
The security functional requirement "*Security attribute based access control (FDP_ACF.1) / Loader*" requires the TSF to implement access control for the Loader functionality.
The security functional requirement "*Static attribute initialisation (FMT_MSA.3) / Loader*"

requires that the TOE provides default values for security attributes.
The ability to update the security attributes is restricted to privileged subject(s) as further detailed in the security functional requirement "*Management of security attributes (FMT_MSA.1) / Loader*".
The security functional requirements "*Security roles (FMT_SMR.1) / Loader*", "*Timing of identification (FIA_UID.1) / Loader*" and "*Timing of authentication (FIA_UAU.1) / Loader*" specify the roles that the TSF recognises and the actions authorized before their identification.
The security functional requirement "*Specification of management functions (FMT_SMF.1) / Loader*" provides additional controlled facility for adapting the loader behaviour to the user's needs. These management functions ensure that the required access control, associated to the loading feature, can be realised using the functions provided by the TOE.
The security functional requirement "*Audit storage (FAU_SAS.1) / Loader*" requires to store the identification data needed to enforce that only the allowed version of the Additional Memory Image can be loaded on the Initial TOE.

264 Therefore, *FTP_ITC.1 / Loader*, *FDP_UCT.1 / Loader*, *FDP_UIT.1 / Loader*, *FDP_ACC.1 / Loader*, *FDP_ACF.1 / Loader* together with *FMT_MSA.3 / Loader*, *FMT_MSA.1 / Loader*, *FMT_SMR.1 / Loader*, *FMT_SMF.1 / Loader*, *FIA_UID.1 / Loader*, *FIA_UAU.1 / Loader,* and *FAU_SAS.1 / Loader* are suitable to meet these security objectives.

Security objective "Secure activation of the Additional Code (*JIL.O.Secure-AC-Activation*)"

265 The justification related to the security objective "Secure activation of the Additional Code (*JIL.O.Secure-AC-Activation*)" is as follows:

266 The security functional requirement "*Audit storage (FAU_SAS.1) / Loader*" requires the TSF to fail secure unless the Loading of the Additional Memory Image, including update of the Identification data, is comprehensive, as specified by *JIL.O.Secure-AC-Activation*.

267 Therefore, *FPT_FLS.1 / Loader* is suitable to meet this security objective.

Security objective "Secure identification of the TOE (*JIL.O.TOE-Identification*)"

268 The justification related to the security objective "Secure identification of the TOE (*JIL.O.TOE-Identification*)" is as follows:

269 The security functional requirement "*Audit storage (FAU_SAS.1) / Loader*" requires the TSF to store the Identification Data of the Memory Images.
The security functional requirement "*Stored data integrity monitoring and action (FDP_SDI.2)*" requires the TSF to detect the integrity errors of the stored data and react in case of detected errors.
The security functional requirement "*Audit review (FAU_SAR.1) / Loader*" allows any user to read this Identification Data.

270 Therefore, *FAU_SAS.1 / Loader*, and *FAU_SAR.1 / Loader* together with *FDP_SDI.2* are suitable to meet this security objective.

Security objective "Secure identification of the Memory Image (*O.MemImage-Identification*)"

271 The justification related to the security objective "Secure identification of the Memory Image (*O.MemImage-Identification*)" is as follows:

272 The security functional requirement "*Audit storage (FAU_SAS.1) / Loader*" requires the TSF to store the Identification Data of the Memory Images.

The security functional requirement "*Stored data integrity monitoring and action (FDP_SDI.2)*" requires the TSF to detect the integrity errors of the stored user data and react in case of detected errors.
The security functional requirement "*Audit review (FAU_SAR.1) / Loader*" allows any user to read this Identification Data.
The security functional requirement "*Audit storage (FAU_SAS.1) / Loader*" requires the TSF to fail secure unless the Loading of the Additional Memory Image, including update of the Identification data, is comprehensive, as specified by *JIL.O.Secure-AC-Activation*.

273 Therefore, *FAU_SAS.1 / Loader*, *FAU_SAR.1 / Loader* together with *FDP_SDI.2* and *FPT_FLS.1 / Loader* are suitable to meet this security objective.

6.4.3 Additional security requirements are consistent

"Cryptographic operation (*FCS_COP.1*)"

274 These security requirements have already been argued in *Section : Security objective "Additional Specific Security Functionality (AUG1.O.Add-Functions)"* above.

**"Static attribute initialisation (*FMT_MSA.3 / Memories*),
Management of security attributes (*FMT_MSA.1 / Memories*),
Complete access control (*FDP_ACC.1 / Memories*),
Security attribute based access control (*FDP_ACF.1 / Memories*)"**

275 These security requirements have already been argued in *Section : Security objective "Area based Memory Access Control (AUG4.O.Mem-Access)"* above.

**"Static attribute initialisation (*FMT_MSA.3 / Loader*),
Management of security attributes (*FMT_MSA.1 / Loader*),
Specification of management function (*FMT_SMF.1 / Loader*),
Security roles (*FMT_SMR.1 / Loader*),
Timing of identification (*FIA_UID.1 / Loader*),
Timing of authentication (*FIA_UAU.1 / Loader*)"**

276 These security requirements have already been argued in *Section : Security objective "Protection against Abuse of Functionality (BSI.O.Abuse-Func)"* and *Section : Security objectives "Protection of the confidentiality of the TSF (JIL.O.Prot-TSF-Confidentiality)", "Secure loading of the Additional Code (JIL.O.Secure-Load-ACode)" and "Secure loading of the Additional Memory Image (O.Secure-Load-AMemImage)"* above.

**"Audit storage (*FAU_SAS.1 / Loader*),
Audit review (*FAU_SAR.1 / Loader*)"**

277 These security requirements have already been argued in *Section : Security objective "Secure identification of the TOE (JIL.O.TOE-Identification)"* and *Section : Security objective "Secure identification of the Memory Image (O.MemImage-Identification)"* above.

"Failure with preservation of secure state (*FPT_FLS.1 / Loader*)"

278 This security requirement has already been argued in *Section : Security objective "Secure activation of the Additional Code (JIL.O.Secure-AC-Activation)"* and *Section : Security objective "Secure identification of the Memory Image (O.MemImage-Identification)"* above.

"Inter-TSF trusted channel(*FTP_ITC.1 / Sdiag*),
Audit review (*FAU_SAR.1 / Sdiag*),
Limited capabilities (*FMT_LIM.1 / Sdiag*),
Limited availability (*FMT_LIM.2 / Sdiag*)

279 These security requirements have already been argued in *Section : Security objective "Protection against Abuse of Functionality (BSI.O.Abuse-Func)"* above.

6.4.4 Dependencies of Security Functional Requirements

280 All dependencies of Security Functional Requirements have been fulfilled in this Security Target except :

- those justified in the *BSI-CC-PP-0084-2014* Protection Profile security requirements rationale,
- those justifed in *AUG* security requirements rationale,
- the dependency of *FCS_COP.1* on FDP_ITC.1 or FDP_ITC.2 or FCS_CKM.1 or FCS_CKM.5 (see discussion below),
- the dependency of *FCS_COP.1* on FCS_CKM.6 (see discussion below),
- the dependency of *FAU_SAR.1 / Loader* on FAU_GEN.1 (see discussion below),
- the dependency of *FAU_SAR.1 / Sdiag* on FAU_GEN.1 (see discussion below).

281 Details are provided in *Table 13* below.

Table 13. Dependencies of security functional requirements

Label	Dependencies	Fulfilled by security requirements in this Security Target	Dependency already in *BSI-CC-PP-0084-2014* or in *AUG*
FRU_FLT.2	FPT_FLS.1	Yes	Yes, *BSI-CC-PP-0084-2014*
FPT_FLS.1	None	No dependency	Yes, *BSI-CC-PP-0084-2014*
FMT_LIM.1 / Test	FMT_LIM.2 / Test	Yes	Yes, *BSI-CC-PP-0084-2014*
FMT_LIM.2 / Test	FMT_LIM.1 / Test	Yes	Yes, *BSI-CC-PP-0084-2014*
FMT_LIM.1 / Loader	FMT_LIM.2 / Loader	Yes	Yes, *BSI-CC-PP-0084-2014*
FMT_LIM.2 / Loader	FMT_LIM.1 / Loader	Yes	Yes, *BSI-CC-PP-0084-2014*
FMT_LIM.1 / Sdiag	FMT_LIM.2 / Sdiag	Yes	Yes, *BSI-CC-PP-0084-2014*
FMT_LIM.2 / Sdiag	FMT_LIM.1 / Sdiag	Yes	Yes, *BSI-CC-PP-0084-2014*
FAU_SAS.1	None	No dependency	Yes, *BSI-CC-PP-0084-2014*
FDP_SDC.1	None	No dependency	Yes, *BSI-CC-PP-0084-2014*
FDP_SDI.2	None	No dependency	Yes, *BSI-CC-PP-0084-2014*
FPT_PHP.3	None	No dependency	Yes, *BSI-CC-PP-0084-2014*
FDP_ITT.1	FDP_ACC.1 or FDP_IFC.1	Yes	Yes, *BSI-CC-PP-0084-2014*
FPT_ITT.1	None	No dependency	Yes, *BSI-CC-PP-0084-2014*

Table 13. Dependencies of security functional requirements (continued)

Label	Dependencies	Fulfilled by security requirements in this Security Target	Dependency already in *BSI-CC-PP-0084-2014* or in *AUG*
FDP_IFC.1	FDP_IFF.1	No, see *BSI-CC-PP-0084-2014*	Yes, *BSI-CC-PP-0084-2014*
FCS_RNG.1	None	No dependency	Yes, *BSI-CC-PP-0084-2014*
FCS_COP.1	[FDP_ITC.1 or FDP_ITC.2 or FCS_CKM.1, or FCS_CKM.5]	No, see discussion below	Yes, *AUG* ***#1***
	FCS_CKM.6	No, see discussion below	
FDP_ACC.1 / Memories	FDP_ACF.1 / Memories	Yes	***No,*** *CCMB-2022-11-002 R1*
FDP_ACF.1 / Memories	FDP_ACC.1 / Memories	Yes, by FDP_ACC.1 / Memories	Yes, *AUG* ***#4***
	FMT_MSA.3 / Memories	Yes	
FMT_MSA.3 / Memories	FMT_MSA.1 / Memories	Yes	Yes, *AUG* ***#4***
	FMT_SMR.1 / Memories	No, see *AUG* ***#4***	
FMT_MSA.1 / Memories	[FDP_ACC.1 / Memories or FDP_IFC.1]	Yes, by FDP_ACC.1 / Memories and FDP_IFC.1	Yes, *AUG* ***#4***
	FMT_SMF.1 / Memories	Yes	***No,*** *CCMB-2022-11-002 R1*
	FMT_SMR.1 / Memories	No, see *AUG* ***#4***	Yes, *AUG* ***#4***
FMT_SMF.1 / Memories	None	No dependency	***No,*** *CCMB-2022-11-002 R1*
FIA_API.1	None	No dependency	Yes, *BSI-CC-PP-0084-2014*
FTP_ITC.1 / Loader	None	No dependency	Yes, *BSI-CC-PP-0084-2014*
FDP_UCT.1 / Loader	[FTP_ITC.1 / Loader or FTP_TRP.1 / Loader]	Yes, by FTP_ITC.1 / Loader	Yes, *BSI-CC-PP-0084-2014*
	[FDP_ACC.1 / Loader or FDP_IFC.1 / Loader]	Yes, by FDP_ACC.1 / Loader	

Table 13. Dependencies of security functional requirements (continued)

Label	Dependencies	Fulfilled by security requirements in this Security Target	Dependency already in *BSI-CC-PP-0084-2014* or in *AUG*
FDP_UIT.1 / Loader	[FTP_ITC.1 / Loader or FTP_TRP.1 / Loader]	Yes, by FTP_ITC.1 / Loader	Yes, *BSI-CC-PP-0084-2014*
	[FDP_ACC.1 / Loader or FDP_IFC.1 / Loader]	Yes, by FDP_ACC.1 / Loader	
FDP_ACC.1 / Loader	FDP_ACF.1 / Loader	Yes	***No,*** *CCMB-2022-11-002 R1*
FDP_ACF.1 / Loader	FDP_ACC.1 / Loader	Yes	***No,*** *CCMB-2022-11-002 R1*
	FMT_MSA.3 / Loader	Yes	
FMT_MSA.3 / Loader	FMT_MSA.1 / Loader	Yes	***No,*** *CCMB-2022-11-002 R1*
	FMT_SMR.1 / Loader	Yes	
FMT_MSA.1 / Loader	[FDP_ACC.1 / Loader or FDP_IFC.1]	Yes	***No,*** *CCMB-2022-11-002 R1*
	FDP_SMF.1 / Loader	Yes	
	FDP_SMR.1 / Loader	Yes	
FMT_SMR.1 / Loader	FIA_UID.1 / Loader	Yes	***No,*** *CCMB-2022-11-002 R1*
FIA_UID.1 / Loader	None	No dependency	***No,*** *CCMB-2022-11-002 R1*
FIA_UAU.1 / Loader	FIA_UID.1 / Loader	Yes	***No,*** *CCMB-2022-11-002 R1*
FDP_SMF.1 / Loader	None	No dependency	***No,*** *CCMB-2022-11-002 R1*
FPT_FLS.1 / Loader	None	No dependency	***No,*** *CCMB-2022-11-002 R1*
FAU_SAS.1 / Loader	None	No dependency	**Yes**, *BSI-CC-PP-0084-2014*
FAU_SAR.1 / Loader	FAU_GEN.1	No, by FAU_SAS.1 / Loader instead, see discussion below	***No,*** *CCMB-2022-11-002 R1*
FTP_ITC.1 / Sdiag	None	No dependency	***No,*** *CCMB-2022-11-002 R1*
FAU_SAR.1 / Sdiag	FAU_GEN.1	No, see discussion below	***No,*** *CCMB-2022-11-002 R1*

282 Part 2 of the Common Criteria defines the dependency of "*Cryptographic operation (FCS_COP.1)*" on "Import of user data without security attributes (FDP_ITC.1)" or "Import of user data with security attributes (FDP_ITC.2)" or "Cryptographic key generation (FCS_CKM.1)" or “Cryptographic key derivation (FCS_CKM.5)”. In this particular TOE, the ES has all possibilities to implement its own creation function, in conformance with its security policy. Therefore, no specific SFR is defined in this ST.

283 Part 2 of the Common Criteria defines the dependency of "*Cryptographic operation (FCS_COP.1)*" on "Timing and event of cryptographic key destruction (FCS_CKM.6)". In this particular TOE, there is no specific function for the destruction of the keys. The ES has all possibilities to implement its own destruction function, in conformance with its security policy. Therefore, FCS_CKM.6 is not defined in this ST.

284 Part 2 of the Common Criteria defines the dependency of "*Audit review (FAU_SAR.1) / Loader*" on "Audit data generation (FAU_GEN.1)". In this particular TOE, "*Audit storage (FAU_SAS.1) / Loader*" is used to ensure the storage of audit data, because FAU_GEN.1 is too comprehensive to be used in this context. Therefore this dependency is fulfilled by "*Audit storage (FAU_SAS.1) / Loader*" instead.

285 Part 2 of the Common Criteria defines the dependency of "*Audit review (FAU_SAR.1) / Sdiag*" on "Audit data generation (FAU_GEN.1)". In this particular TOE, there is no specific function for audit data generation, the data to be audited are just stored. Therefore, FAU_GEN.1 is not defined in this ST.

6.4.5 Rationale for the Assurance Requirements

Security assurance requirements added to reach EAL5 (*Table 10*)

286 Regarding application note 22 of *BSI-CC-PP-0084-2014*, this Security Target chooses EAL5 with augmentations because developers and users require a high level of independently assured security in a planned development and require a rigorous development approach without incurring unreasonable costs attributable to specialist security engineering techniques.

287 EAL5 represents a meaningful increase in assurance from EAL4 by requiring semiformal design descriptions, a more structured (and hence analyzable) architecture, and improved mechanisms and/or procedures that provide confidence that the TOE will not be tampered during development.

288 The component ALC_FLR.2 is chosen as an augmentation in this ST because a solid flaw management is key for the continuous improvement of the security IC platforms, especially on markets which need highly resistant and long lasting products.

289 The assurance components in an evaluation assurance level (EAL) are chosen in a way that they build a mutually supportive and complete set of components. All dependencies introduced by the requirements chosen for augmentation are fulfilled. Therefore, these components add additional assurance to EAL5, but the mutual support of the requirements and the internal consistency is still guaranteed.

290 The ST31P450 A09 platform Security Target for composition claims conformance to Common Criteria 2022 revision 1 and strict conformance to the *BSI-CC-PP-0084-2014* Protection Profile. As the *BSI-CC-PP-0084-2014* claims conformance to Common Criteria version 3.1 it does not contain “Evaluation Methods / Evaluation Activities”. It explains there is no rationale in this Security Target for the disposition of such “Evaluation Methods / Evaluation Activities” for the extended security assurance requirements.

291 Note that detailed and updated refinements for assurance requirements are given in *Section 6.3*.

Dependencies of assurance requirements

292 Dependencies of security assurance requirements are fulfilled by the EAL5 package selection.

293 The augmentation to this package identified in paragraph *227* does not introduce dependencies not already satisfied by the EAL5 package, and is considered as consistent augmentation:

- ASE_TSS.2 dependencies (ASE_INT.1, ASE_REQ.1 and ADV_ARC.1) are fulfilled by the assurance requirements claimed by this ST.
- ALC_FLR.2 has no dependency,
- ALC_DVS.2 and AVA_VAN.5 dependencies have been justified in *BSI-CC-PP-0084-2014*.

7 TOE summary specification (ASE_TSS)

294 This section demonstrates how the TOE meets each Security Functional Requirement, which will be further detailed in the ADV_FSP and ADV_ARC documents.

7.1 Limited fault tolerance (FRU_FLT.2)

295 The TSF provides limited fault tolerance, by managing a certain number of faults or errors that may happen, related to random number generation, power supply, data flows and cryptographic operations, thus preventing risk of malfunction.

7.2 Failure with preservation of secure state (FPT_FLS.1)

296 The TSF provides preservation of secure state by detecting and managing the following events, resulting in an immediate interruption or reset:

- Die integrity violation detection,
- Errors on memories,
- Glitches,
- High voltage supply,
- CPU errors,
- Sequence control,
- etc..

297 The ES can generate a software reset.

7.3 Limited capabilities (FMT_LIM.1) / Test, Limited capabilities (FMT_LIM.1) / Sdiag, Limited capabilities (FMT_LIM.1) / Loader, Limited availability (FMT_LIM.2) / Test, Limited availability (FMT_LIM.2) / Sdiag & Limited availability (FMT_LIM.2) / Loader

298 The TOE is either in Test, Admin or User configuration.

299 The TOE may also be in Basic Diagnostic (aka Diagnostic), Secure Diagnostic or Genuine Check volatile configuration.

300 The Test and Diagnostics configurations are reserved to ST.

301 The possible transitions are: Test to Admin, Admin to User, Admin to Genuine Check, Admin

302 The TSF ensures the switching and the control of TOE configuration, the corresponding access control and the control of the corresponding capabilities.The transition controls rely on several strong mechanisms. Part of the transitions are only possible in the STMicroelectronics audited environment.

303 The TSF reduces the available features depending on the TOE configuration.

304 The customer can choose to disable irreversibly the Loading capability.

305 The customer can choose to irreversibly enable or disable the Secure Diagnostic capability. Only if the customer enables it, for quality investigation purpose, ST can exercise the Secure Diagnostic capability with a secure protocol, in an audited environment.

7.4 Inter-TSF trusted channel (FTP_ITC.1) / Sdiag

306 In Secure Diagnostic volatile configuration, the System Firmware provides a secure channel to allow another IT product to operate a Secure Diagnostic transaction.

7.5 Audit review (FAU_SAR.1) / Sdiag

307 The System Firmware allows to read the Secure Diagnostic status (permanently disabled, permanently enabled, disabled but still configurable).

7.6 Stored data confidentiality (FDP_SDC.1)

308 The TSF ensures confidentiality of the User Data, thanks to the following features:

- Memories scrambling and encryption,
- Protection of NVM sectors,
- LPU.

7.7 Stored data integrity monitoring and action (FDP_SDI.2)

309 The TSF ensures stored data integrity, thanks to the following features:

- Memories parity control,
- Protection of NVM sectors,
- LPU.

7.8 Audit storage (FAU_SAS.1)

310 In User configuration, the TOE provides commands to store data and/or pre-personalisation data and/or supplements of the ES in the NVM. These commands are only available to authorized processes, and only until phase 6.

7.9 Resistance to physical attack (FPT_PHP.3)

311 The TSF ensures resistance to physical tampering, thanks to the following features:

- The TOE implements a set of countermeasures that reduce the exploitability of physical probing.
- The TOE is physically protected by active shields that command an automatic reaction on die integrity violation detection.

7.10 Basic internal transfer protection (FDP_ITT.1), Basic internal TSF data transfer protection (FPT_ITT.1) & Subset information flow control (FDP_IFC.1)

312 The TSF prevents the disclosure of internal and user data thanks to:

- Memories scrambling and encryption,
- Bus encryption,
- Mechanisms for operation execution concealment,
- Leakage protection in libraries.

7.11 Random number generation (FCS_RNG.1)

313 The TSF provides 8-bit true random numbers that can be qualified with the test metrics required by the *BSI-AIS20/AIS31* standard for a PTG.2 class device.

7.12 Cryptographic operation: TDES operation (FCS_COP.1) / TDES

314 The TOE provides an EDES+ accelerator that has the capability to perform 3-key Triple DES encryption and decryption in Electronic Code Book (ECB) and Cipher Block Chaining (CBC) mode conformant to *NIST SP 800-67* and *NIST SP 800-38A*.

7.13 Cryptographic operation: AES operation (FCS_COP.1) / AES

315 The AES accelerator provides the following standard AES cryptographic operations for key sizes of 128, 192 and 256 bits, conformant to *FIPS PUB 197* with intrinsic counter-measures against attacks:

- cipher,
- inverse cipher,

316 The AES accelerator can operate in Electronic Code Book (ECB) and Cipher Block Chaining (CBC) mode.

7.14 Static attribute initialisation (FMT_MSA.3) / Memories

317 The TOE enforces a default memory management policy when none other is programmed by the ES.

318 The customer can also use the LPU to protect segments where part of its code and data are stored.

7.15 Management of security attributes (FMT_MSA.1) / Memories & Specification of management functions (FMT_SMF.1) / Memories

319 The TOE provides memory protections: NVM sector protection, limitation in unprivileged mode, optionally the LPU.

7.16 Subset access control (FDP_ACC.1) / Memories & Security attribute based access control (FDP_ACF.1) / Memories

320 The TOE enforces the memory management policy for data access and code access thanks to a Library Protection Unit (LPU), and for sector protection, programmed by the ES.

321 Overriding the LPU set of access rights, depending on the TOE configuration, the TOE enforces additional protections on specific parts of the memories.

7.17 Authentication Proof of Identity (FIA_API.1)

322 In Admin configuration or Genuine check configuration, the System Firmware provides commands based on a cryptographic mechanism which allows another IT product to check that the TOE is a genuine TOE.

7.18 Inter-TSF trusted channel (FTP_ITC.1) / Loader, Basic data exchange confidentiality (FDP_UCT.1) / Loader, Data exchange integrity (FDP_UIT.1) / Loader & Audit storage (FAU_SAS.1) / Loader

323 In Admin configuration, the System Firmware provides a secure channel to allow another IT product to operate a maintenance transaction.

324 The ciphered data is automatically decrypted then stored in the requested memory.

325 A maintenance transaction can end only after a successful integrity check of the loaded data or an erase. The identification data associated with the memory update is automatically logged during the session,

7.19 Subset access control (FDP_ACC.1) / Loader & Security attribute based access control (FDP_ACF.1) / Loader

326 In Admin configuration, during a maintenance transaction, the System Firmware verifies if the Loader access conditions are satisfied and returns an error when this is not the case.

327 In particular, the additional memory update must be intended to be assembled with the memory update previously loaded.

7.20 Failure with preservation of secure state (FPT_FLS.1) / Loader

328 In Admin configuration, the System Firmware enforces that a maintenance transaction can only end when it is consistent or canceled by an erase.

7.21 Static attribute initialisation (FMT_MSA.3) / Loader

329 In Admin configuration, the System Firmware provides restrictive default values for the Flash Loader security attributes.

7.22 Management of security attributes (FMT_MSA.1) / Loader & Specification of management functions (FMT_SMF.1) / Loader

330 In Admin configuration, the System Firmware provides the capability for an authorized user to change part of the Flash Loader security attributes.

7.23 Security roles (FMT_SMR.1) / Loader

331 The System Firmware supports the assignment of roles to users through the assignment of different keys for the different roles. This allows to distinguish between the roles of ST Loader, User Loader, Delegated Loader, Secure Diagnostic, and Everybody.

7.24 Timing of identification (FIA_UID.1) / Loader & Timing of authentication (FIA_UAU.1) / Loader

332 The System Firmware identifies the user through the key selected for authentication. This is performed by verifying an encryption, thus preventing to unveil the key.

333 After this authentication, both parties share a session key.

334 A limited number of operations is allowed on behalf of the user before the user is identified and authenticated, such as boot, authentication and non-critical queries.

7.25 Audit review (FAU_SAR.1) / Loader

335 In Admin configuration, the System Firmware allows to read the product information and the identification data of all memory updates previously loaded on the TOE.

8 Identification

Table 14. TOE components

IC Maskset name	IC version	Master identification number (1)	Firmware version
K410A	C	0x01F1	3.1.1 and 3.1.2

1. Part of the product information.

Table 15. Guidance documentation

Component description	Reference	Version
Secure dual interface microcontroller with enhanced security and up to 450 Kbytes of flash memory- ST31P450 datasheet	DS_ST31P450	8
ARM® Cortex SC000 Technical Reference Manual	ARM DDI 0456 A	A
ARMv6-M Architecture Reference Manual	ARM DDI 0419 C	C
ST31P450 Firmware V3 User Manual	UM_ST31P450_FWv3	8
ST31P secure MCU platform Security guidance - Application note	AN_SECU_ST31P	3
ST31P platform random number generation - User manual	UM_ST31P_TRNG	3

Table 16. Sites list

Site	Address	Activities(1)
AMTC / Toppan Dresden	Advanced Mask Technology Center Gmbh & Co KG Rahnitzer Allee 9, 01109 Dresden, Germany	MASK
CHIPBOND JY	Chipbond Technology Corporation No. 10, Prosperity 1 Road, Science Park, Hsinchu, Taiwan R.O.C	BE
CHIPBOND LH	Chipbond Technology Corporation No. 3, Li Hsin 5 Road, Science Park, Hsinchu, Taiwan R.O.C	BE
DNP	Dai Nippon Printing Co., Ltd 2-2-1 Kami-Fukuoka, Fujimino-shi Saitama 356-8507 Japan	MASK

Table 16. Sites list (continued)

Site	Address	Activities[1]
DPE	Dai Printing Europe Via C. Olivetti 2/A I-20041 Agrate Italy	MASK
Feiliks	Feili Logistics (Shenzhen) Co., Ltd. Zhongbao Logistics Building, No. 28 Taohua Road, FFTZ, Shenzhen, Guangdong 518038, China	WHSD
Pantos	LX Pantos Logistics (HK) Co Ltd. Unit 1001, 10/F, Mapletree Logistics Hub, 30 Tsing Yi Road, Tsing Yi, N.T., Hong Kong	WHSD
SAMSUNG Giheung	Samsung Electronics. Co., Ltd. Samsung-ro, Giheung-gu, Yongin-si, Gyeonggi-do, 17113 Republic of Korea	FE
SAMSUNG Hwaseong	Samsung Electronics. Co., Ltd. Samsungjeonja-ro, Hwaseong-si, Gyeonggi-do, 18448 Republic of Korea	MASK
SAMSUNG Onyang	Samsung Electronics. Co., Ltd. 158 Baebang-ro Baebang-eup Asan-City, Chungcheongnam-Do, Korea	WHS
SMARTFLEX	Smartflex Technology 37A Tampines, Street 92, Singapore 528886	BE
ST AMK1	STMicroelectronics 5A Serangoon North Avenue 5 554574 Singapore	DEV
ST AMK6	STMicroelectronics 18 Ang Mo Kio Industrial park 2 569505 Singapore	WHS WHSD
ST Bouskoura	STMicroelectronics 101 Boulevard des Muriers 20180 Bouskoura Maroc	BE WHSD

Table 16. Sites list (continued)

Site	Address	Activities[1]
ST Calamba	STMicroelectronics 9 Mountain Drive, LISP II, Brgy La mesa, CALAMBA, Philippines 4027	BE WHSD
ST Catania	STMicroelectronics Str. Primosole, 50, 95121 Catania, Italy	DEV
ST Crolles	STMicroelectronics 850 rue Jean Monnet 38926 Crolles France	DEV FE MASK
ST Gardanne	CMP Georges Charpak 880 Avenue de Mimet 13541 Gardanne France	BE
ST Grenoble	STMicroelectronics 12 rue Jules Horowitz, BP 217 38019 Grenoble Cedex France	DEV BE
ST Ljubljana	STMicroelectronics d.o.o. Ljubljana Tehnoloski park 21, 1000 Ljubljana, Slovenia	DEV
ST Loyang	STMicroelectronics 7 Loyang Drive 508938 Singapore	WHSD
ST Palermo	STMicroelectronics Via Tommaso Marcellini, 8L, 90129 Palermo, Italy	DEV
ST Rennes	STMicroelectronics 10 rue de Jouanet, ePark 35700 Rennes France	DEV

Table 16. Sites list (continued)

Site	Address	Activities[1]
ST Rousset	STMicroelectronics 190 Avenue Célestin Coq. 13106 Rousset Cedex France	DEV EWS WHSD
STS Shenzhen	STS Microelectronics 16 Tao hua Rd., Futian free trade zone Shenzhen P.R. China 518038	BE
STS Shenzhen Lab	STS Microelectronics 17 Taohua Road, Futian Free trade zone Shenzhen P.R. China 518038	BE
ST Sophia	STMicroelectronics SKY Sophia, Bât B, 776 Rue Albert CAQUOT, 06410 BIOT, France	DEV
ST Toa Payoh	STMicroelectronics 629 Lorong 4/6 Toa Payoh 319521 Singapore	EWS
ST Tunis	STMicroelectronics Elgazala Technopark, Raoued, Gouvernorat de l'Ariana, PB21, 2088 cedex, Ariana, Tunisia	IT
TERADYNE	Teradyne 200 avenue Olivier Perroy Les portes de Rousset - Bâtiment C 13970 Rousset France	EWS
UTAC Indonesia	PT UTAC Manufacturing Services Indonesia Jl Maligi I Lot A1-4, Kawasan Industri KIIC, Sukaluyu, Teluk Jambe Timur, Karawang 41361, Indonesia	BE

1. DEV = hardware or software development, FE = front-end manufacturing, EWS = electrical wafer sort and/or pre-perso, BE = back-end manufacturing, MASK = mask manufacturing or mask preparation, WHS = warehouse, WHSD = warehouse delivery, IT = information technology

9 References

Table 17. Common Criteria

Component description	Reference	Version
Common Criteria for Information Technology Security Evaluation - Part 2: Security functional components, April 2017	CCMB-2017-04-002 R5	3.1 Rev 5
Common Criteria for Information Technology Security Evaluation - Part 1: Introduction and general model, November 2022	CCMB-2022-11-001 R1	2022 Rev 1
Common Criteria for Information Technology Security Evaluation - Part 2: Security functional components, November 2022	CCMB-2022-11-002 R1	2022 Rev 1
Common Criteria for Information Technology Security Evaluation - Part 3: Security assurance components, November 2022	CCMB-2022-11-003 R1	2022 Rev 1
Common Criteria for Information Technology Security Evaluation - Part 5: Pre-defined packages of security requirements, November 2022	CCMB-2022-11-005 R1	2022 Rev 1
Errata and Interpretation for CC:2022 (Release 1) and CEM:2022 (Release 1), October 2025	CCMB Reference	1.2

Table 18. Protection Profile

Component description	Reference	Version
Eurosmart - Security IC Platform Protection Profile with Augmentation Packages	BSI-CC-PP-0084-2014	1.0

Table 19. Other standards

Ref	Identifier	Description
[1]	BSI-AIS20/AIS31	A proposal for: Functionality classes for random number generators, W. Killmann & W. Schindler BSI, Version 2.0, 18-09-2011
[2]	NIST SP 800-67	NIST SP 800-67, Recommendation for the Triple Data Encryption Algorithm (TDEA) Block Cipher, revised November 2017, National Institute of Standards and Technology
[3]	FIPS PUB 197	FIPS PUB 197, Advanced Encryption Standard (AES), National Institute of Standards and Technology, U.S. Department of Commerce, updated May 2023.
[4]	ISO/IEC 9796-2	ISO/IEC 9796, Information technology - Security techniques - Digital signature scheme giving message recovery - Part 2: Integer factorization based mechanisms, ISO, 2002

Table 19. Other standards

Ref	Identifier	Description
[5]	NIST SP 800-38A	NIST SP 800-38A Recommendation for Block Cipher Modes of Operation, 2001, with Addendum Recommendation for Block Cipher Modes of Operation: Three Variants of Ciphertext Stealing for CBC Mode, October 2010
[6]	ISO/IEC 14888	ISO/IEC 14888, Information technology - Security techniques - Digital signatures with appendix - Part 1: General (1998), Part 2: Identity-based mechanisms (1999), Part 3: Certificate based mechanisms (2006), ISO
[7]	AUG	Smartcard Integrated Circuit Platform Augmentations, Atmel, Hitachi Europe, Infineon Technologies, Philips Semiconductors, Version 1.0, March 2002.
[8]	IEEE 1363-2000	IEEE 1363-2000, Standard Specifications for Public Key Cryptography, IEEE, 2000
[9]	IEEE 1363a-2004	IEEE 1363a-2004, Standard Specifications for Public Key Cryptography - Amendment 1:Additional techniques, IEEE, 2004
[10]	PKCS #1 V2.1	PKCS #1 V2.1 RSA Cryptography Standard, RSA Laboratories, June 2002
[11]	MOV 97	Alfred J. Menezes, Paul C. van Oorschot and Scott A. Vanstone, Handbook of Applied Cryptography, CRC Press, 1997
[12]	NIST SP 800-90	NIST Special Publication 800-90, Recommendation for random number generation using deterministic random bit generators (Revised), National Institute of Standards and Technology (NIST), June 2015
[13]	JIL-CC-SRFPDCL	Security requirements for post-delivery code loading, Joint Interpretation Library, Version 1.0, February 2016
[14]	ANSSI-CC-CER/F/06.002	PP0084: Interpretations, ANSSI, April 2016
[15]	PG-083	Guide des mécanismes cryptographiques : règles et recommandations concernant le choix et le dimensionnement des mécanismes cryptographiques, ANSSI-PG-083, version 2.04, janvier 2020
[16]	ECCG-ACM	Agreed cryptographic mechanisms, version 2.0, European Cybersecurity Certification Group (ECCG) sub-group on Cryptographic - April 2025.

Appendix A Glossary

A.1 Terms

Authorised user

A user who may, in accordance with the TSP, perform an operation.

Composite product

Security IC product which includes the Security Integrated Circuit (i.e. the TOE) and the Embedded Software and is evaluated as composite target of evaluation.

End-consumer

User of the Composite Product in Phase 7.

Integrated Circuit (IC)

Electronic component(s) designed to perform processing and/or memory functions.

IC Dedicated Software

IC proprietary software embedded in a Security IC (also known as IC firmware) and developed by ***ST***. Such software is required for testing purpose (IC Dedicated Test Software) but may provide additional services to facilitate usage of the hardware and/or to provide additional services (IC Dedicated Support Software).

IC Dedicated Test Software

That part of the IC Dedicated Software which is used to test the TOE before TOE Delivery but which does not provide any functionality thereafter.

IC developer

Institution (or its agent) responsible for the IC development.

IC manufacturer

Institution (or its agent) responsible for the IC manufacturing, testing, and pre-personalization.

IC packaging manufacturer

Institution (or its agent) responsible for the IC packaging and testing.

Initialisation data

Initialisation Data defined by the TOE Manufacturer to identify the TOE and to keep track of the Security IC's production and further life-cycle phases are considered as belonging to the TSF data. These data are for instance used for traceability and for TOE identification (identification data)

Object

An entity within the TSC that contains or receives information and upon which subjects perform operations.

Packaged IC

Security IC embedded in a physical package such as micromodules, DIPs, SOICs or TQFPs.

Pre-personalization data

Any data supplied by the Card Manufacturer that is injected into the non-volatile memory by the Integrated Circuits manufacturer (Phase 3). These data are for instance used for traceability and/or to secure shipment between phases. If "Package 2: Loader dedicated for usage by authorized users only" is used the Pre-personalisation Data

may contain the authentication reference data or key material for the trusted channel between the TOE and the authorized users using the Loader.

Secret

Information that must be known only to authorised users and/or the TSF in order to enforce a specific SFP.

Security IC

Composition of the TOE, the Security IC Embedded Software, User Data, and the package.

Security IC Embedded SoftWare (ES)

Software embedded in the Security IC and not developed by the IC designer. The Security IC Embedded Software is designed in Phase 1 and embedded into the Security IC in Phase 3.

Security IC embedded software (ES) developer

Institution (or its agent) responsible for the security IC embedded software development and the specification of IC pre-personalization requirements, if any.

Security attribute

Information associated with subjects, users and/or objects that is used for the enforcement of the TSP.

Sensitive information

Any information identified as a security relevant element of the TOE such as:

– the application data of the TOE (such as IC pre-personalization requirements, IC and system specific data),
– the security IC embedded software,
– the IC dedicated software,
– the IC specification, design, development tools and technology.

Smartcard

A card according to ISO 7816 requirements which has a non volatile memory and a processing unit embedded within it.

Subject

An entity within the TSC that causes operations to be performed.

Test features

All features and functions (implemented by the IC Dedicated Software and/or hardware) which are designed to be used before TOE Delivery only and delivered as part of the TOE.

TOE Delivery

The period when the TOE is delivered which is after Phase 3 ***or Phase 4 in this Security target***.

TSF data

Data created by and for the TOE, that might affect the operation of the TOE.

User

Any entity (human user or external IT entity) outside the TOE that interacts with the TOE.

User data

All data managed by the Smartcard Embedded Software in the application context. User data comprise all data in the final Smartcard IC except the TSF data.

A.2 Abbreviations

Table 20. List of abbreviations

Term	Meaning
AIS	Application notes and Interpretation of the Scheme (BSI).
BE	Back End manufacturing.
BSI	Bundesamt für Sicherheit in der Informationstechnik.
CBC	Cipher Block Chaining.
CC	Common Criteria Version 3.1. R5.
CC:2022	Common Criteria version 2022
CPU	Central Processing Unit.
CRC	Cyclic Redundancy Check.
DCSSI	Direction Centrale de la Sécurité des Systèmes d'Information.
DES	Data Encryption Standard.
DEV	Development.
DIP	Dual-In-Line Package.
DRBG	Deterministic Random Bit Generator.
EAL	Evaluation Assurance Level.
ECB	Electronic Code Book.
EDES	Enhanced DES.
EEPROM	Electrically Erasable Programmable Read Only Memory.
ES	Security IC Embedded Software.
EWS	Electrical Wafer Sort.
FE	Front End manufacturing.
FIPS	Federal Information Processing Standard.
I/O	Input / Output.
IC	Integrated Circuit.
ISO	International Standards Organisation.
IT	Information Technology.
LPU	Library Protection Unit.
MASK	Mask manufacturing.
NESCRYPT	Next Step Cryptography Accelerator.
NIST	National Institute of Standards and Technology.
NVM	Non Volatile Memory.
OSP	Organisational Security Policy.

Table 20. List of abbreviations (continued)

Term	Meaning
OST	Operating System for Test.
PP	Protection Profile.
PUB	Publication Series.
RAM	Random Access Memory.
RF	Radio Frequency.
RF UART	Radio Frequency Universal Asynchronous Receiver Transmitter.
ROM	Read Only Memory.
RSA	Rivest, Shamir & Adleman.
SAR	Security Assurance Requirement.
SFP	Security Function Policy.
SFR	Security Functional Requirement.
SOIC	Small Outline IC.
ST	Context dependent : STMicroelectronics or Security Target.
TDES	Triple Data Encryption Standard
TOE	Target of Evaluation.
TQFP	Thin Quad Flat Package.
TRNG	True Random Number Generator.
TSC	TSF Scope of Control.
TSF	TOE Security Functionality.
TSFI	TSF Interface.
TSP	TOE Security Policy.
TSS	TOE Summary Specification.
WHS	Warehouse.
WHSD	Warehouse Delivery

IMPORTANT NOTICE – PLEASE READ CAREFULLY

STMicroelectronics NV and its subsidiaries (“ST”) reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST’s terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers’ products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. For additional information about ST trademarks, please refer to *www.st.com/trademarks*. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2026 STMicroelectronics – All rights reserved